

THE IRON AGE

Established 1855

New York, October 10, 1912

Vol. 90: No. 15

Mistakes in Testing Steam Boilers

The First of Three Articles Discussing
What Refined Equipment for Testing
Boilers and Furnaces Has Shown

BY ALBERT A. CARY*

In the reports of many tests of boilers and their attached furnaces and other appliances, there is shown a lack of the careful investigation which is needed to obtain an exact understanding of what their real performances are. Crude apparatus is too frequently used, together with uncalibrated instruments. Results of an apparently remarkable character are produced. They cause us to wonder and it is curious that most of the reports of such tests fail to give sufficient information to allow one to check them by an analysis—in other words, to test their rationality.

Focussing on the Main Object of a Test

The exact purpose for which a test is made is too often lost sight of. A concentration of observations upon the particular part of the apparatus in use, the value of which is primarily the object of the test, is too often lacking, and the individual value of this part is too often confused in the mixed result obtained by testing the whole attached apparatus as though they were but a single part.

The purpose of the test may be to determine the value of a special furnace, or stoker, or method of setting, or else it may be to test the boiler itself or a superheater. As all these parts are combined, the test must include all more or less completely, but the part under specific observation should primarily be observed with the greatest care and refinement, while, secondarily, its effect upon its attached parts must be observed with sufficient care to find its adaptability to the whole combination.

It is unfortunately a fact that too many look upon the boiler and its attached furnace as one integral piece of apparatus. The same method of testing is used whether the trial is to determine the value of some new or special form of furnace or whether a new form of boiler is being investigated. Of course, if extreme refinement is used throughout such tests, the same method of testing may be pursued in the case of testing either boiler or furnace, as, with the unusually complete collection of data obtained, the performance of each part may be

finally separated. Such tests including such a large number of careful observations are seldom made.

Boiler and Furnace Separate Entities

In my work I have been called upon to make tests of furnaces alone, to determine their efficiency or adaptability, and no attached boiler is required to obtain this information. In many cases the furnace is not used for steam generation, but for entirely different purposes. The boiler, on the contrary, is not capable of operation without the application of heat, but

its individuality of performance is nevertheless obtainable and the restrictions limiting its performance should be noted. The boiler and furnace are thus seen to be two distinct pieces of apparatus and should be so regarded.

The furnace is purely a piece of chemical apparatus where, by bringing about a chemical action between the combustible constituents of the fuel and oxygen in the air (or fuel) heat is developed.

The investigator of a furnace's performance should have a sufficient knowledge of chemistry, as applied to combustion, and he should have at his command a proper equipment of the necessary chemical apparatus to make his furnace investigation sufficiently complete.

The boiler, on the contrary, as compared to the furnace, is an absorber of heat, and it is a mechanical or physical piece of apparatus operating under physical laws. The efficiency of a boiler is largely governed by the performance of the furnace as the higher the temperature of the furnace gases supplied to it, providing it is properly proportioned to absorb a large percentage of the heat supplied, the greater its economy becomes.

Watching Furnace Temperature in Testing the Boiler

The testing engineer, when testing the efficiency of boilers, should pay particular attention to the furnace temperatures obtained, and if a sufficient temperature is not resulting from the furnace conditions found, he should discover the cause of furnace's inefficiency and correct it if possible. Otherwise, he must make proper

An Important Contribution to Industrial Engineering

Accompanying this is the first of three related articles which will be a noteworthy addition to the literature on steam power and industrial engineering.

The second article will illustrate the use and application of the apparatus which has been developed to make a perfect boiler test.

The third article will discuss a test showing the advantage of the care exercised and the refined apparatus employed. This analysis will include an interesting heat balance, an explanation how boiler and furnace efficiency may be separated and an illuminating description of the way that smoke is formed in furnaces, showing apparatus for determining the amount of non-gaseous matter discharged, and a semi-automatic means for recording the density of smoke.

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allowances for the undesirable conditions existing and point them out in his report, as it is manifestly improper to charge the boiler with inefficiency for which it is not responsible.

In securing the desirable high furnace temperature the conductor of the tests must keep in mind the limitations imposed by the coal he is using, due to the variable fusing temperatures of the ash of different coals. With many coals there is a limit of temperature for the fire bed. When this temperature is exceeded it will lead to the formation of a troublesome clinker. This soon reduces the efficiency of furnace and sometimes the refuse fuses to a pasty mass which has an even more troublesome effect on furnace operation, although a somewhat higher temperature in certain cases will largely eliminate the last-named trouble. With such troubles imminent, the fuel and its ash should be carefully investigated, and if it is found that the coal is exceptional, or not representative of the average fuel available for this plant, a change should be made in order to obtain a fair result in the test.

The Confusing Deductions from Combined Efficiency

The common practice of offering in a report the combined efficiency of boiler and furnace is apt to lead to confusion in deductions. Of course, if this combined efficiency is very high, we can conclude that both boiler and furnace are performing their functions satisfactorily, but in the greater number of tests, where such large percentages of combined efficiency do not occur, it is difficult to draw satisfactory conclusions.

In the days of James Watt it was common practice to report the number of pounds of coal required for an indicated horsepower at the engine. Such a report did not consider the various efficiencies of the boiler and the engine, both of which contributed to the final result reported and advancement did not progress rapidly until their individual efficiencies were studied separately.

The same is true of the boiler and the furnace when we consider only the efficiency between the coal pile and the steam outlet. In a certain case I recall results of a trial which were reported as giving a combined efficiency of 64 per cent. This was considerably below the guarantee which had been given. Both the boiler and furnace manufacturers were loud in their denunciations of the other's apparatus; but with the data collected during this trial there was little to show who was really at fault.

As the combined efficiency is composed of the product of the separate furnace and boiler efficiencies, this result might have been obtained by any of the following combinations:

Boiler efficiency Per cent.		Furnace efficiency Per cent.		Combined efficiency Per cent.
66	X	97	=	64
68.5	X	93.5	=	64
72	X	89	=	64
74	X	86.5	=	64
80	X	80	=	64
83.5	X	76.6	=	64

A boiler efficiency of 66 per cent. is certainly too low, under average working conditions, to be acceptable, while the corresponding 97 per cent. furnace efficiency shows excellent performance. On the other hand, 83.5 per cent. boiler efficiency is an excellent result, but it certainly would be wrong to continue in operation with a furnace efficiency of only 76.6 per cent.

Flue Gas Analyses Commonly Valueless

The flue gas analyses frequently reported are seldom of much value, as will be shown later. The samples of gas are so often taken from improper positions. They are so frequently collected by methods which do not obtain fair representative samples and little attention is paid whether they are obtained with an open or closed furnace door, or whether collected with the fire well burned down or with a fresh charge of coal just introduced into the furnace.

By noting such conditions I can easily obtain a set of fine analyses or a set of poor results. Thus, in many tests, the value of gas analysis, as an indication of furnace conditions, is of but little value, especially with disarranged apparatus, or with the use of poor absorbing reagents coupled with careless manipulation. Under these

conditions it is not surprising to see reported surprisingly high CO₂, or analyses showing 82, 83 or 84 per cent. of nitrogen (by difference), which are impossible with our coals used for fuel.

The Matter of Temperature Readings

The temperature tests frequently found in reports of furnace and boiler trials, which are very important, are often open to question. The selection of proper positions to obtain fair average temperature readings does not always receive the proper attention required to obtain sufficiently accurate results, and proper correction for the direct readings of even accurate apparatus is too often neglected.

The true temperature of the furnace is not easily obtained, and I have known of more than one case where with optical pyrometers the temperature of some position in the fire bed was used to determine furnace temperatures. It is easily possible to obtain all sorts of temperature readings by taking various parts of the fire bed or by observing the same position in different short intervals of time.

Readings of the temperature of escaping gases into the flue outlet generally need considerable consideration. In testing two horizontal tubular boilers of the same size and in the same plant, I obtained the following results:

	Boiler No. 1	Boiler No. 2
Excess of air used in the furnace, per cent.	70	49
Excess of air found at the flue outlet, per cent.	103	71

These boilers returned their gases over their tops to a flue outlet in the rear and the greater part of the air leakage occurred through this top covering.

The temperature of the escaping gases, as indicated by the nitrogen filled thermometer, were in the No. 1 boiler 543 deg. F., No. 2 boiler 482 deg. F.

Had there been no leakage of air through the setting, these gases would have been in the No. 1 boiler 607 deg. F., No. 2 boiler 561 deg. F.

The infiltration of this cold outside air through the boiler setting reduces the apparent efficiency of the boiler due to its chilling effect, and such reduction in efficiency certainly should not be charged up against the boiler, as it was clearly the fault of bad masonry.

In testing a water-tube boiler I found the following results: Excess of air used in furnace, 45.05 per cent.; excess of air found at flue outlet, 95.79 per cent.

The average flue gas analyses found at these two positions was as follows:

	Furnace	Flue
CO ₂	12.706	9.053
O	6.624	10.417
CO	0.012	0.000
N (by difference)	80.658	80.530

The mistake frequently made in taking the sample of gas for analysis from the flue outlet is clearly shown in this case, as it certainly does not indicate the conditions existing in the furnace. This test was made under natural draft conditions, but a following test made under forced draft showed no air leakage through this bad setting, but indicated, on the contrary, a slight leakage of the gases from the interior outward.

The Matter of Firing the Furnace

Means for determining or expressing the value of a fireman who stokes the fire with a hand-fired furnace is seldom used and we all know that an expert fireman will obtain much better results than the ordinary average fireman generally found in boiler rooms. It is by the use of a very expert fireman in one case and a poor fireman in another case that many an absurdly high guaranty has been apparently verified.

I recall a case where the maker of an automatic furnace guaranteed that he would produce 10 per cent. better economy in a plant than could be obtained with their hand-fired boilers, and in his contract he carefully stipulated that he would conduct the tests himself. The test was made by him and he presented his results, which apparently showed that he had done even better than he guaranteed. Suspicion, however, was aroused and I was

retained to determine whether the guarantee was really fulfilled. I found that he had used the stupid foreign fireman he found at the plant for the hand-fired test, apparently allowing him to keep the fire going in a most wasteful manner. But when it came to test his own device he apparently used the most expert method possible to obtain the highest possible results.

In the tests which I conducted I permitted him to take charge, under my personal supervision, of his own furnace, and his great expertness in handling the fire soon became apparent. When I tested the hand-fired boiler I used a fireman who was well trained in stoking for tests instead of the worthless fireman at the plant, a procedure which called forth vigorous protests, but no fair comparison could be obtained unless both furnaces were tested alike.

The result was that the saving shown by him amounted to only about 2 per cent. The loss in the hand-fired boiler was due to the necessary frequent openings of the furnace doors for coaling, slicing and cleaning, while in his case the coal was fed to the grates and the ash was discharged automatically.

Means for Ascertaining Expertness of Fireman

Some may say that the quality of the gases will show the difference between the methods employed by different firemen. To a certain extent this is true, but I use a device (which will be described later) which automatically gives the exact number of seconds that the furnace doors are opened during the test and also the number of times the door is open, so that by making the allowance for the time required for cleaning fires I can tell the average length of time of each furnace door opening. These results along with the results shown in the analysis of the gases, when reported, will show how far the expertness of the fireman enters into the final results obtained. There is still further information gained by use of this apparatus as will be described later.

I have found that a most important feature in tests of furnaces and boilers is the ability of the testing engineer to follow the occurrences taking place during the entire course of his test very closely at all times. By the old methods, which keep the testing engineer and his assistants on the jump every moment in taking the numerous readings, he has very little time to note the changes taking place during the course of the test and it is not until after he has a chance to calculate results from his observations that he is able to note that something very interesting has occurred but has been overlooked. Then, by plotting out results and by reasoning from his observations, he may succeed in finding the cause of some of the happenings, but not all.

I have endeavored to build up a combination of testing apparatus which will tell me at any time during the course of the test, with a fair degree of accuracy, just how all conditions under observation stand as well as what is the performance of both boiler and furnace, so that any change in conditions may be noted when they actually occur and be carefully observed.

This equipment was not originated at any one time, but nearly every test has seen some additional piece of apparatus or improvement, to supply information which I found lacking, in working up previous tests. In presenting in the next article the description of this part of my equipment, I am hoping that it may contribute sufficiently to this important subject of testing furnaces, boilers and their attachments to emphasize the necessity of using the greatest care and expertness in obtaining results which are used to give information, either to individual purchasers or to the public at large concerning the true value of such apparatus. In most cases such tests will produce much valuable information which will help the manufacturers of the equipment in improving their products.

The rapidly increasing volume of business transacted by the Titanium Alloy Mfg. Company, Niagara Falls, N. Y., having rendered the transportation problem acute, a 3000-lb. Mack truck has been added to its equipment and will ply between its plant in the outskirts and points in the city. A garage has been built, 21 x 35 ft., of pressed red brick, sufficiently large to accommodate four automobiles.

National Machine Tool Builders' Association

Below is given the programme of the eleventh annual convention of the National Machine Tool Builders' Association, to be held at the Hotel Astor, New York, October 16 to 18:

Wednesday, October 16

First Session.

9:00 A. M.—Registration of members.

10:00 A. M.—1. Roll call.

2. Reading of minutes.

3. Report of Membership Committee, Chas. E. Hildreth, chairman.

4. Announcement of convention committees.

(a) Auditing Committee.

(b) Resolutions Committee.

(c) Press Committee.

(d) Nominating Committee.

5. Call for resolutions.

6. Reports of officers.

7. Reports of committees.

Second Session.

2:00 P. M.—Address, "Export Trade," by W. A. Viall, Brown & Sharpe Manufacturing Company, Providence, R. I.

Address, "The Use of an Association Catalogue in the Development of Foreign Markets," by Stanley H. Bullard, Bullard Machine Tool Company, Bridgeport, Conn.

Address, "How United States Patents Might Be Made of Greater Value to Patentees," by Samuel W. Banning, Chicago, Ill.

Thursday

Third Session.

10:00 A. M.—Address, "What We Should Do in the Way of Influencing Tariff Legislation," by Frederick A. Geier, Cincinnati Milling Machine Company, Cincinnati, Ohio.

Address, "How Could the Association be Benefited by the Formation of a Mechanical Section?" by E. J. Kearney, Kearney & Trecker Company, Milwaukee, Wis.

Fourth Session.

The committees enumerated below will meet promptly at the time indicated.

(a) Lathe Committee, 2:00 P. M.

(b) Sensitive Drilling Machine Committee, 2:30 P. M.

(c) Boring Machine Committee, 2:30 P. M.

(d) Gear Cutting Machine Committee, 2:30 P. M.

(e) Grinding Machine Committee, 2:30 P. M.

(f) Hand Screw Machine Committee, 4:00 P. M.

(g) Planing Machine Committee, 4:00 P. M.

Friday

Fifth Session.

(h) Radial Drilling Machine Committee, 9:00 A. M.

(i) Milling Machine Committee, 9:00 A. M.

(j) Shaping Machine Committee, 10:30 A. M.

(k) Vertical Drilling Machine Committee, 10:30 A. M.

(l) Turret Lathe Committee, 10:30 A. M.

Sixth Session.

2:30 P. M.—Report of convention committees.

Suggestions by members as to the work of the association.

Unfinished business.

Election of officers.

Selection of place of next convention.

Executive session, "Heart-to-Heart Talk."

Adjournment.

The president of the association is E. P. Bullard, Jr., Bridgeport, Conn., and the general manager is James H. Herron, Cleveland, Ohio.

Hamilton, Ontario, and its industries are made the subject of a booklet issued by H. M. Marsh, commissioner of industries. By the use of numerous illustrations the importance of the city as a manufacturing center is emphasized and data are given concerning some of the plants and their products. An interesting list is headed "Hamilton Plants of United States Parentage." It contains the names of 39 companies, well known in various lines in the United States, which in recent years have built works on the Canadian side. The population of Hamilton is put at nearly 90,000 and the gain in the past year at 10,000.

The Detroit Shipbuilding Company, Detroit, Mich., has booked an order from the George Hall Coal Company for two steel bulk freighters to be operated in the coal trade on the St. Lawrence River. Each steamer will be 247 ft. long with 43 ft. beam; capacity, about 3000 tons. The cost is estimated at \$400,000.

Mattie furnace of the Girard Iron Company, Girard, Ohio, was blown in September 26 after a long idleness.

Economies in Mold Making in the Foundry*

How and When to Use Different Classes of Machines—Third Article on Shop and Foundry Management

BY STUART DEAN

Making a mold involves a great many small, simple operations which have to be carefully done. The least neglect or lack of skill in doing any one of these many small operations means the loss of the casting. Molding is usually done by having one man carry the mold through all its steps from the start to finish. This requires a high-class, physically powerful man who has served a long time at the trade.

Each step in making a mold is simple and easily learned. Therefore, the tendency of the times is to have one man do one or two of the operations of mold making only and pass the mold on to others to do the following operations.

The Jarring Machine in the Foundry System

The jar ram molding machine fits into this system admirably. Under this system each man becomes more expert at his one or two simple operations of mold making than the best skilled mechanic. He saves time by keeping all his appliances for this one task right with him. His wage rate is lower than the rate of a fully skilled molder, because he is not paid for a complete knowledge of molding. Each of these men turns out more work than a molder would, because any slowing up makes the work accumulate. Each has to do his part of the molding as fast as the molds come to him, so as to get them off his hands and on the next man's.

All these points in the system reduce the cost of castings materially below that of the old way. One foundryman in Cincinnati put it this way: "Nine-tenths of the steps in producing a mold are plain operations that a laborer can do. Our aim is to make laborers do all these and use the skilled man on the skilled tenth of the work only."

The system is worked out as follows: One man, or a small gang of men, temper sand all day; a second gang fills the flasks, jars them and delivers them to the finishing gang, who draw the patterns, tool the molds, if this is necessary, and black them. The next man or men dry them. Most of the molds are left open until the last thing in the evening and then all hands jump in and place the cores, close the molds and clamp them.

The gangs are kept down to as few men as possible. At blast time there is always a mold left open, not cored, another rammed with the pattern still in it. These molds are ready to start on the next day. The gangs start right in at whistle time turning out molds.

All the sand in the foundry is kept at the jarring machine. All the molds are taken to this point by the crane to be shaken out. The shaking out goes on all day, whenever the laborers get spare time. Each flask is placed on the follow board the instant it is shaken out. This saves extra handling.

This system of shaking out and cutting the sand as it is needed saves the expense of a night gang. It reduces the day labor gang to the minimum; uses the crane evenly all day and cuts out waiting on the part of the molders for the crane.

A mold that cost \$3 to make by the old system of one man molding will be reduced to about \$1.90 by the gang system using a jar ramming machine. This system is adaptable only to molds larger than 24 x 24 in. inside measurements.

Unit Output for Different Kinds of Molding

A foundry having intricate core work on about half

the tonnage will find the output of castings per man connected with molding running about as follows:

400 lb. per man at old style floor work system.

550 lb. per man at bench work.

625 lb. to 830 lb. for small molding machine work.

650 lb. for gang system at jar ramming floor work.

These figures will run higher for foundries making less difficult work. The relation of pounds output per man on the different kinds of molding will stay about the same. The small molding machine will hold the record and the jar ram floor work will follow next.

A foundry using the gang system of molding will arrive at such a point of independence that the loss of the best molder in the shop is not felt very much. It is generally harder to replace the exceptionally good helper who has adjusted himself to the methods of the shop, knows where everything is kept, knows all the sizes of the flasks, brings out the cores and places them beside the molds, and fits himself into all the chinks of the foundry, than it is to replace a molder.

The Scope of Different Molding Methods

On all molds up to, say, 14 x 16-in. inside measurement of flask, the squeezer molding machine will produce faster than if the molds are made on the bench or by the jar ramming machine.

On all molds 26 in. square and larger the plain jar ramming machine will produce faster than hand ramming.

Molds between the squeezer size and the jar ramming machine size are not as yet made economically by the molding machine. There are machines on which the molds are hand rammed. The drags are deposited on the floor by the machine. There are others that jar ram the molds, but do not deposit the drags on the floor. This size of work will not be satisfactorily done until a machine is made that rams the mold by the jar ramming process, deposits the drag on the floor and moves along, or is moved along, to the next position.

Any molding machine to be a success must be a very simple mechanism—the simpler the better.

Molds 14 x 16 in. inside measurement of flask and smaller should be made on a hand-squeezer rollover-pattern drawing machine that handles both cope and drag at one squeeze and draws the mold down and not up from the pattern. The pattern must be above the sand when being drawn, otherwise the pattern making expense will be greatly increased; only a very perfect pattern will draw down from a ceiling of sand without pulling the sand with it. A job with a hanging body of sand cannot be made by lifting the sand up off the pattern.

Using the Squeezer Molding Machine

Copes 8½ in. deep and drags 8 in. deep, with the pattern extending 6 in. from parting, can be handled perfectly on the squeezer machine. The ramming will be done with the shovel handle on this deep work. Such a squeezer molding machine will hold the record tonnage output in a foundry. On small molding the greatest economy is made by reducing the motions that the man goes through in making a mold. This can be done on the machine that makes the cope and drag at the same time. The man picks up his shovel only once in making a complete mold. He fills the cope, drag and sieve with sand and rams the mold all at one handling of the shovel. He strikes off both the cope and the drag at one sweep; puts on both bottom board and squeezer board at one movement; a

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movement clamps both cope and drag; they are both squeezed with a single motion, and the patterns are drawn with a return motion of the handle; the mold is closed and carried out as a whole in a single trip.

On this kind of work the pattern board has the sprue and riser post of brass mounted on it. On the squeezer board is a form that makes the pouring bowl on top of the mold so that this hand work is eliminated.

It is best to adopt a layout for the gates and risers that will cover all cases and never vary from this. The best layout for the gates and risers is at each end on the center line, at each side on the center line, in each corner, two near the center crossways, two in near center lengthways, and one exactly in the center. Nearly any combination can be worked with a standard outfit of squeezer boards by using this layout.

Economies With the Squeezer Molding Machine

Place vents permanently on the pattern board to save cutting them in the mold by hand. A plain job in a 14 x 16-in. mold can be made in two minutes using bands in the flask, and in less time if solid flasks are used. This is timing the man on a single hour's run. He will not be able to keep up this rate all day, but it shows how rapidly molds can be made on the small machine.

The output on the machine depends entirely on the strength of the man. A very powerful man can put up 100 molds 14 x 16 in. between 7:00 a.m. and 11:00 a.m. He will have to be physically fit for the task—built on the lines of a heavy freight locomotive. It takes 19 min. to change the boards, squeeze, etc., on such a machine.

Teach the man carefully to make no false moves; to peen with the shovel handle a certain number of strokes—no more or no less; to lay his tools always in the same place, and to remove the sand with one sweep, not two, when striking off the mold. A green laborer the third day he works, if carefully taught, will make a 14 x 16-in. mold at the rate of one every 3¼ min.

Laborers should shake out the small machine molds as soon as they are poured, pile up the castings, throw water on the sand and next morning temper the sand for the machine man before he starts. If he is forced to cut his own sand he will not be able to put up a big day's work. Some firms even go so far as to have a different gang pour off the molds from those that make them. A man can then go the limit all day without having to face the tiring task of carrying and pouring half a ton of molten iron at the hour when he is already worn out from molding.

In piece-work foundries everything is in readiness for the molder to start in the morning, his sand is cut and the pattern is in his machine.

The Case of the Jarring Machine

Jar ramming is the only perfect way to ram molds larger than 24 x 24 in. Any saving in time made by the jar machine on smaller molds is lost in the labor of placing the molds upon and taking them off the machine. It is safe to assume that the ramming of molds larger than 24 x 24 in. consumes 20 to 50 per cent. of a molder's time, depending on the style of the work. The jar ram machine, by abolishing hand ramming, will save 20 to 50 per cent. of the molding expense. An hour's ramming can be done in a minute; the ramming is perfectly done. The even ramming prevents scabs and swollen spots on the castings.

The molds come out very smooth, that is, no tiny particles stick to the pattern as with hand ramming. There is a slight sliding of the sand on the surface of the pattern, or a slight give of the pattern that keeps all particles free from any sticking tendency. The inside of a jar rammed mold is as smooth as velvet. The sand is always hard and strong at the corner of the parting where the pattern meets the follow-board. No filling in of sand at the parting after the mold is rolled over is necessary as with a hand-rammed mold. The sand is hardest next to

the pattern and is softer back from the pattern so that venting is unnecessary. This saves time and saves marring the pattern with the vent wire. Preserving a smooth surface on the pattern saves the time of tooling the surface of the mold.

The jar ramming machine must not only be served by the main foundry crane, but must have a quick handling boom crane of its own. The output of the machine is controlled by the speed at which molds can be put on and taken off. One minute is all the time that is required to ram a mold, so that one machine well equipped with mold-handling apparatus will ram all the molds for a large foundry.

Working a Gang with the Jarring Machine

Following is the time of making a mold on the jarring machine by the gang system working at the regular speed that is kept up all day. Foundrymen can compare this time to their own mold-making time and see how much saving the gang jarring system would give them:

Drag 30 x 36-In. Inside Measurement, 18 In. Deep.

- 1 min.—Putting the pattern and the drag on the follow board.
 - 1¼ min.—Clamping the flask and follow board together.
 - 6¾ min.—Sifting sand around the pattern and shoveling in the sand.
 - 2 min.—Sifting sand on top of the pattern.
 - 2 min.—Shoveling the drag full of sand.
 - 1 min.—Putting the sand frame on and filling it with sand.
 - ½ min.—Crane placing drag onto the jar ramming machine.
 - ½ min.—Jar ramming.
 - 1 min.—Putting bottom board on.
 - ¾ min.—Clamping bottom board.
 - ½ min.—Crane takes the drag to the molder to finish.
 - ¾ min.—Take off follow board.
- NOTE.—The time on all molds of a size will be about the same, no matter what the pattern be up to this point. This next item will vary with the style of the pattern although the time will be short with the gang system, as the men work rapidly.
- 10 min.—Finishing the drag up to the point of blacking.
 - ½ min.—Spray black the drag.
 - 5 min.—Drying with an oil torch.

NOTE.—Some foundries diminish this labor cost by drying the molds in ovens, instead of drying with a torch, which will pay if the foundry has the crane capacity, the room, and a handy oven arrangement.

Cope 30 x 36 In., 6 In. Deep

- 1 min.—Put cope and pattern on follow board.
- 3¼ min.—Sifting sand upon the pattern, getting the jiggers and clay-washing them.
- 2 min.—Setting jiggers.
- 2¼ min.—Filling cope with sand.
- ¾ min.—Putting on a sand frame 7 in. high and filling it with sand.
- ¼ min.—Crane taking cope to the machine.
- ½ min.—Ram cope.
- ¼ min.—Take cope off machine.
- ¾ min.—Take off sand frame and shovel off the extra sand from top.
- 1 min.—Strike off cope.
- ½ min.—Crane taking cope off machine and turning it over.
- 1 min.—Setting it down at mold finisher.
- ¾ min.—Take off follow board.

NOTE.—The following time item varies according to the job:

- 10 min.—Draw cope pattern and finish the mold.
- 1 min.—Spray wet black the mold.

The rest of the mold-making would run the same as ordinary molding when done at a rapid rate.

Wet Blacking of Molds

There is great economy in the wet blacking of molds. This can be done in one-fifth the time required for dry blacking. The total length of time, including the drying, will be about the same as that consumed in dry blacking with a camel's hair brush. Spray the blacking on with compressed air by means of an atomizer.

A casting made in a wet blacked mold will come out clean. A single light blow of a hammer will knock off the sand. Castings free from sand reduce the machine shop time.

A dried mold has a hard, clean surface for the iron to lie against. The blacking hardens and cements all the loose corners to the mold.

Use the coal oil torch for drying. Make your own coil pipe for the torches when they wear out. One laborer will dry a great many molds in a day and will become very expert at it.

A New Automatic Drill Chuck

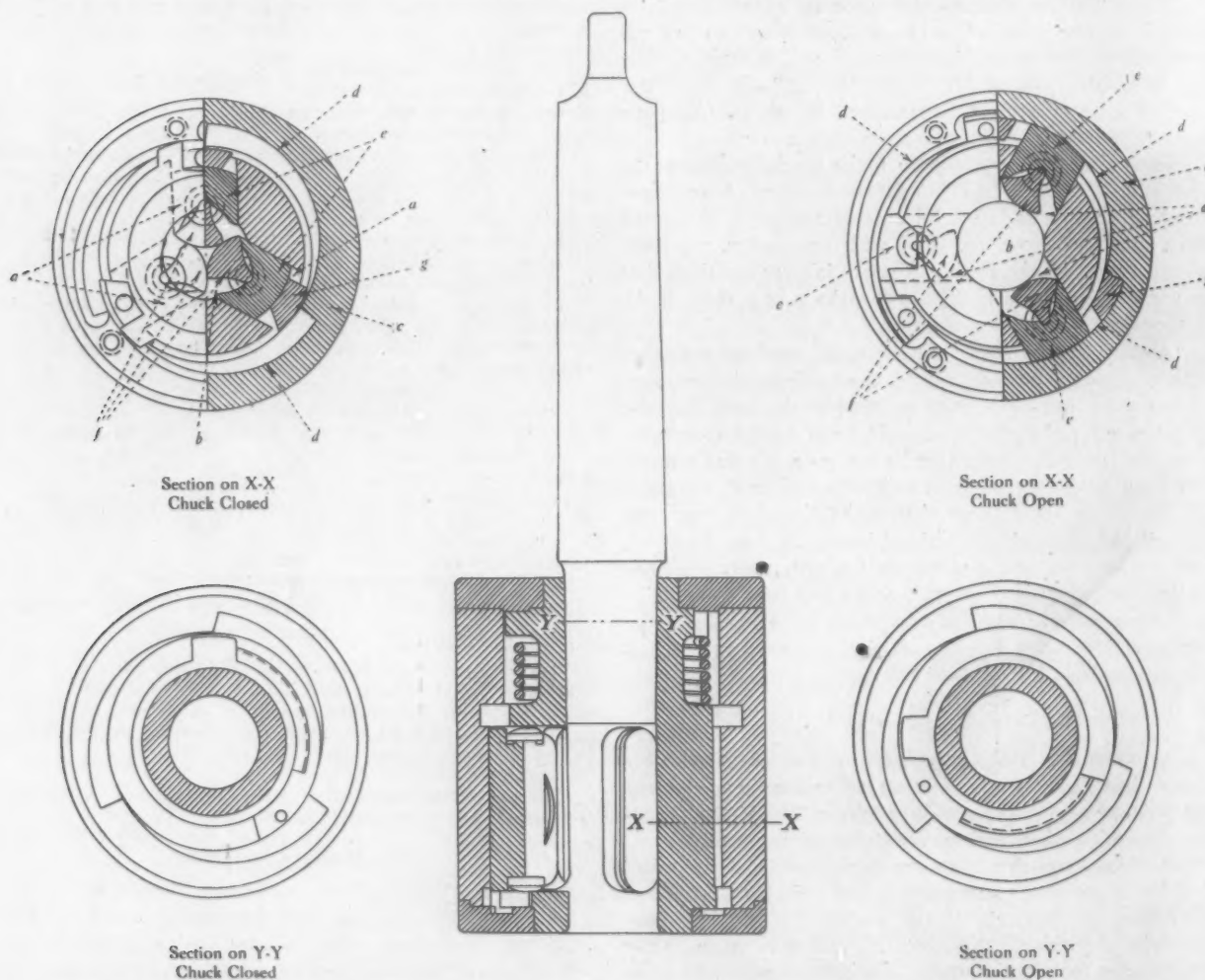
Several Special Features of the Wahlstrom Device Including the Use of Spacing Blocks

After ten years of experimenting the Wahlstrom Tool Company, 346 Carroll street, Brooklyn, N. Y., has developed an automatic self-closing drill chuck which is made in two sizes. It is not possible to hold taper shank tools in the chuck, but a straight shank drill, reamer or any other tool within the range of the chuck will be gripped, it being possible to insert or remove the tools without stopping the spindle.

In the accompanying engraving there are reproduced a longitudinal section of the chuck together with transverse sections at two different points with the chuck open and closed. The chuck consists of a body having three radial slots *a* cut through its walls and opening into a central aperture, *b*, which receives the tool shank. The body has a shank for attaching the chuck to a drilling machine or other machine tool and it also has an annular shell, *c*, surrounding the body and rotatable thereon. This shell has three internal cam surfaces *d* and is held in position by two caps which are screwed fast to the annular shell. These caps also engage rabbets formed on the body and prevent a relative longitudinal movement of the shell and the body. There is also a coil spring surrounding the

internal cam surfaces because, it is explained, if that were done there would be danger of the jaws slipping and failing to operate effectively. The portion of the movement of the shell during which the jaws and cam surfaces are kept apart is sufficient to permit a movement of the jaws equal to the eccentricity of the cam surfaces. By removing the spacing means from between the jaws and cam surfaces at the end of this partial movement a further throw of the jaws can be obtained by bringing the jaws and surfaces into direct contact during the second portion of the rotating movement of the shell. With this end in view a number of spacing blocks, *g*, normally lying between the jaws *e* and the internal cam surfaces *d* are provided. Each of these blocks has an enlarged head which tracks in a groove or channel formed in the cap and corresponding in eccentricity to the internal cam surfaces. The inner and outer faces of the spacing blocks have substantially the same curvature as the cam surfaces so that a wide bearing surface is provided. To keep the blocks in line with the jaws during the first part of the rotating movement of the shells a series of recesses formed in the body is provided.

The normal position of the jaws and blocks is shown in the upper left corner of the accompanying drawing. When the shell is rotated in a clockwise direction the jaws are free to move to the position shown in the upper right corner. During this movement the spacing blocks *g*



Details of an Improved Type of Drill Chuck with Cam Surfaces Made by the Wahlstrom Tool Company, Brooklyn, N. Y.

body within the shell, one end of which is fastened to the body and the other to the shell. For clamping a tool in the central opening there are a number of jaws, *e*, working in the slots *a*. Each of these jaws carries a rocking gripper, *f*, which is pivotally mounted on the inner side of the jaw and held in position by annular caps, the outer end of each jaw having practically the same curvature as the internal cam faces *d*.

To enable the chuck to accommodate as many different sizes of drills or other tools as possible means are provided to space the jaws *e* from the cam surfaces *d* during a portion of the rotating movement of the shell. This has been done instead of increasing the eccentricity of the

are moved outward by the eccentricity of the channels engaging their heads, but the blocks are retained in line with the jaws by engagement with the walls of the recesses formed in the body which are provided to keep them in line. When the jaws and the blocks are in this position the latter are free from the recesses and also from the body of the chuck. A further movement in the same direction permits the jaws to move to the position where the blocks are removed from between them and the cam surfaces, the two parts being guided by direct contact. Motion in a counter clockwise direction will first bring the parts back to the position shown in the upper right corner while a further movement will cause the wide walls

on the recesses to engage the blocks and carry them along in line with the jaws to the position shown in the upper left corner.

The maximum diameters of drill handled by the two sizes of chuck are $\frac{1}{2}$ and $\frac{3}{4}$ in., respectively.

Gas Engine with a Simplified Valve

The Mesta Machine Company, Pittsburgh, Pa., has recently brought out a new line of gas engines possessing the features of self-starting by compressed air, perfect muffling, safety control against overspeeding, mechanical make and break ignition, automatic lubrication and a very simple type of valve gear. The valve gear is characterized by the absence of an excessive number of parts so that chance of derangement is thus reduced. Fig. 1 shows one of these engines installed at the plant of Wickwire Brothers, Cortland, N. Y., while the special type of valve used is illustrated in Fig. 2.

In the design of the valve gear there are no trips, oil relays with their pumps and auxiliary valves and no cams, there being only one eccentric for each cylinder end. Cylindrical throttle valves of the butterfly type are used for gas and air and furnish the only means of regulation. It is claimed that they are so efficient that the engine runs with the same steadiness for any load within its range, irrespective of any sudden fluctuations. The queer shape which the valve assumes for perfect regulation is brought out in Fig. 2 and it is stated that it has not been found possible in practice to improve upon the shape of valve laid out on the drawing board from theoretical considerations. If for any reason, such as the presence of tar, grit, gum, etc., the valve should become sluggish and clogged, it can be easily pulled out while the engine is operating on the other cylinder ends and can be cleaned without a shut-down, an additional gas valve being provided at each cylinder end for this purpose. Two igniters are supplied for each cylinder end and they are located away from the valve gear side so that the engineer can take them out and inspect them while the engine is in operation without being caught in the valve gear. The igniters are so located that one is above the center of the cylinder and the other below and immediately above the exhaust chamber.

An interesting test was recently made on one of these engines when operating with the lower igniters only. In this case the engine was tested until it would not carry any additional load and the same process was repeated with the upper set. The engine was rated at 400 kw. and the loads carried with the lower and upper igniters alone in service were 300 and 305 kw. respectively. One of these engines has been in operation for 18 months at a total cost

of \$9,596.43, during which the engine was operated 12,420 hr. out of a possible 13,000 hr., or almost 96 per cent. of the total time. During this period 2,340,000 kw.-hr. was produced at a cost of 0.41c. per kw.-hr. This figure does not include the interest on the first investment.

Lake Superior Corporation

The stockholders of the Lake Superior Corporation, at their annual meeting at Camden, N. J., October 2, heard a report of improving prospects and of increased capacity for production as given by President T. J. Drummond. The report told of the successful flotation of the Algoma Steel Corporation in the past year, with an authorized stock issue of \$30,000,000 and the same amount of bonds. This company took over the Algoma Steel Company, Ltd., the Lake Superior Power Company, the Algoma Commercial Company, Ltd., together with the full interests of Fiborn Limestone Company and the control of Cannelton Coal & Coke Company.

As a result of the consolidation, \$5,000,000 of short-term notes issued by the Lake Superior Corporation and a like amount issued by the Lake Superior Iron & Steel Com-

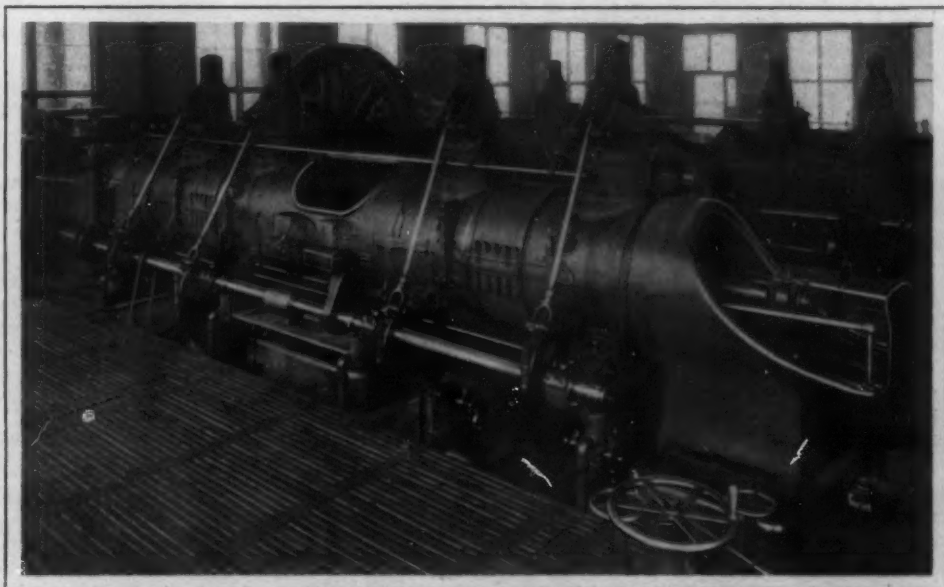


Fig. 1—An Improved Type of Gas Engine Installed by the Mesta Machine Company at the Plant of Wickwire Brothers, Cortland, N. Y.

pany, Ltd., were redeemed and canceled. Various extensions and improvements were undertaken, including a new blooming mill and a new rail mill; but even with these, still further extensions will have to be made to keep pace with increasing demand. The earnings of the first two months of the present fiscal year were quite satisfactory, and orders on hand, it is stated, will insure operation at full capacity. The following directors were elected: T. J. Drummond, J. Tatnall Lea, Frederick McOwen, J. Frater Taylor, Walter K. Whigham, Herbert Coppell, Joseph S. Dale, John T. Terry, Jr., D. C. Newton, Herbert M. Price, Thomas Gibson and W. E. Stabut. Mr. Stabut succeeds R. L. Austin.

Dodwell & Co., Ltd., exporters and importers, have opened their own office in New York City, George W. Lane & Co., Inc., their late agents, having gone into voluntary liquidation. Dodwell & Co., Ltd., have their own branch offices in Yokohama, Kobe and Osaka, in Japan; Hongkong, Shanghai, Foochow and Hankow in China, and Colombo, in Ceylon. They have for many years been doing a large engineering contracting business in the Orient, as well as being foreign agents for railroads and steamship companies, such as the Northern Pacific Railway Company, Barber line of steamers, Holt's lines, etc. The New York office is located at 135 Front street. George M. Dodwell is manager and Paul L. Phelan sub-manager. Fred Dodwell, a director of the company, will also remain here for the present.

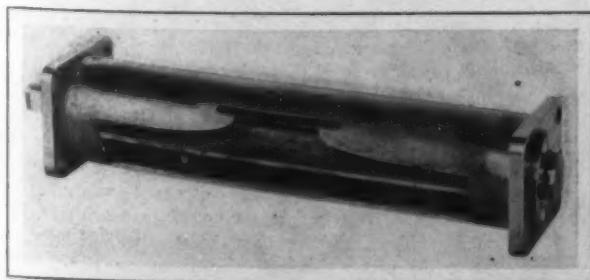


Fig. 2—Special Type of Valve Used with this Engine

S. DIESCHER & SONS.
Mechanical and Civil Engineers,
PITTSBURGH, PA.

American Rolling-Mill Practice*

Comparison of Blooming, Billet and Rail Mills in Germany and the United States —A Contribution to the Rail Question

—BY J. PUPPE, D.ING., BRESLAU.

The development of the iron industry of North America, which has achieved as remarkable a record of progress in the last decade as in the preceding one, and the improved methods of working, especially in respect of rolling mill practice, still form an object-lesson of paramount interest to European iron manufacturers. Early in 1911 it was the author's privilege, in company with Mr. Maleyka, chief engineer of the Siemens Schuckert works, and Werner F. von Siemens, to visit the majority of those iron works of the United States where typical American rolling-mill practice is followed, for the purpose of studying the latest methods and improvements. Among the works visited the following may be mentioned:

1. The Lackawanna Steel Company's works, Buffalo.
2. The several works of the Carnegie Steel Company, viz., Duquesne, Homestead, the Edgar Thomson Works and the Ohio Works at Youngstown.
3. The Jones & Laughlin Steel Company's works.
4. The National Tube Company's works at McKeesport and Ellwood.
5. The Bethlehem Steel Company.
6. The Indiana Steel Company's works at Gary.
7. The Illinois Steel Company's works.
8. Several works of the American Steel & Wire Company.
9. The American Sheet & Tinplate Company's works at Vandergrift.
10. The Youngstown Sheet & Tube Company's works.

The various types of rolling mills are summarized in tabular form, and a few notes on their leading features, with special reference to certain peculiarities which are less familiar to European conditions.

Blooming Mills

During the 'nineties blooming mills in the United States were almost exclusively constructed on the 3-high system, but since the introduction of the 4-in. billet the 2-high reversing mill has been practically universally adopted. The 3-high mill was brought to a remarkable state of perfection by the brothers John and George Fritz, and there are still a number of such mills at work, especially where one section only, or at all events a very limited number of sections, is rolled continuously. In rolling 4-in. billets, however, the great length of the pieces made it impracticable to use the 3-high mill, as the lifting tables could not be made sufficiently long to accommodate them, and the 2-high reversing mill had to take its place.

In contradistinction to German practice, where the blooming mill forms the link between the steel works and the mills for all sections down to 4 in. square and less, also for slabs and flats, in the United States it forms an integral part of a particular rolling-mill train, and performs the roughing down to a certain section only. Typical instances of this practice may be seen at Lackawanna and at Gary. At the Lackawanna works the blooming rolls serve for roughing down the ingots for the billet mill, whereas the heavy rail mill has several stands of blooming rolls for that mill alone. At Gary, where the blooming rolls for the rail and billet mills consist of separate 2-high sets followed by a 3-high set, the arrangement has been planned not only with the object of getting the largest possible output, but has also been determined by the method chosen for driving the trains.

In very rare instances the blooming mill supplies the plate mill with slabs, the practice at the works of the Youngstown Sheet & Tube Company affording one such example. In all other mills visited where slabs are rolled, a type of rolling-mill entirely unknown to the author has been developed, namely, the slabbing mill, which may be described as a universal slab and roughing mill.

The blooming rolls are generally of quite small diameter, the pitch circle of the pinions measuring as a rule 35 to 40 or 42 in., the roll diameter being about 3 to 5 in. smaller. Lately a 34-inch diameter has become the standard for such mills. On this account the roll length

is much shorter than in Europe, generally not exceeding 6 ft. 6 in., as compared with 9 ft. 4 in. in German mills.

The arrangement of grooves is also different, the first groove not being at the side but in the centre, and consisting really of the smooth surface of the roll, which is kept at its full diameter at that part. The production of sections varying greatly in size is attained by giving a very high adjustment, in some cases three times as great as in European practice, where 40 in. is about the maximum. The same pressure can be applied to the rolls, while owing to the small diameter less power is required for driving. The wobbler connecting the upper roll with the pinion must be of a length corresponding to the increased height of rise, and in some instances it was found to measure 22 ft., and in another 17 ft. long.

With such mills remarkably high outputs can be obtained. For instance, the blooming mill at Lackawanna turns out 500 tons in a single shift, the 40-in. mill at Duquesne averages 600 tons per shift, and the 38-in. mill at the same works can turn out 1300 tons per shift. These quantities, of course, fluctuate considerably, but the facility with which such large outputs are obtained is explained by the fact that the ingots are not rolled to anything like the same length as in Europe, the elongation being generally five to six times, and at most seven times. The rolling period is consequently much shorter. On timing the operations at random, the author noted that nine passes were made in 40 sec. and again in 47 sec., seven passes in 41 to 48 sec., and on other occasions the times were remarkably short. In the matter of rapid passes the 3-high mills show great superiority, as might be expected.

Reduction in Section Per Pass

Another striking difference between German and American practice is the rate of diminution of the draft of blooming rolls. Whereas in Germany a reduction of 14 per cent. is hardly ever exceeded, and with harder material an average of 11 to 12 per cent. reduction is the rule, the reduction in the draft from one groove to the next often amounts to 20 per cent. in American practice. The roughing rolls of the rail mill at Lackawanna even give an average reduction of 24 per cent. per pass in the first six passes. How far the structure and quality of the material suffer in the case of rails is a question which will be discussed further on. The final section of the piece after passing the blooming rolls is of course larger than in German practice, and varies generally from 6 to 8 in. square.

The shortness of the rolling period is further accounted for by the manner of controlling the auxiliary engines, which now very generally consist of electric motors. The controllers are operated with very short levers with short ranges, and there are only three notches. "Stop," "Forward," "Backward," with no intermediate steps.

The rolling down operation is mostly performed in the same way as in Germany, the piece being continually turned over and the section retaining its square form. Here and there, however, an entirely different practice is followed. For instance, in the 35-in. mill of the National Tube Company the ingot is rolled out flat in nine passes through the widest groove to a thickness of 4 in. It is then turned on edge and put through the 4-in. groove, then two passes are again made through the 12-in. groove, one pass through the 5-in. groove, and finally one through the 7-in. groove. On account of its great width, after the first nine passes it requires to be guided into the next groove and held with hydraulically operated guides. This method has been introduced at one mill in Germany, but it has considerable disadvantages—first, the difficulty of putting the wide piece through the rolls on edge; and, secondly, there is a tendency to crack at the corners, owing

*Paper substantially in full read before the Iron and Steel Institute.

No.	Name of Company	Type of Mill	Particulars of Engine				Rolls				Work being done	Ingots		Number of Passes	Time taken to Roll (measured)	Final Section	Average Reduction per Pass	Output	Mills which are Supplied	Remarks
			Type	Size of Cylinders	Speed	Pressure	Consumption	Average Power	Maximum Power	Diameter	Length of Barrel	Lift	Method of Lifting	Grooving						
1	Lashawan Steel Co.	Rev. 3-high	2-cylinder reversing	1372 diam. 1676 strike	80	9.6-11.6		H. P. 5500	H. P. 5500	1016	2000	600	Hydraulic	...	17	179 x 178	Per Cent. 15	Total Yearly 300,000	Continuous billet and timber mills	Cast steel rolls.
2	Carnegie Steel Co., Duquesne	"	Two tandem compound	1114 diam. 1378 strike	100	9.6	24.5 kg. per ton	3400	10,000	1016	1828	...	"	5 grooves 647 x 11 mm. circle	21	102 x 102	17	500,000	Continuous billet mill	"
3	"	"	2-cylinder reversing	1066 diam. 1224 strike	120 max.	9.6	24.5 kg. per ton	2400 built for 30,000!	5000	985	1292	...	"	3 grooves 565 x 255 mm. circle	13	154 x 216	15	700,000	710 mm.	"
4	"	3-high	Single cylinder Corbin	1168 diam. 1676 strike	68 min.	9.6	16.4	1200	2200	710	1042	...	"	7 grooves 101 x 60 mm. circle	6	129 x 128	16.5	700,000	565 mm., timber mill; 260 mm., continuous mill	"
5	Carnegie Steel Co., Homestead	2-high	Single cylinder gear drive	711 diam. 1250 strike 25 x 45	100	9.75	...	6800	...	710	...	...	Hydraulic	...	...	...	...	400 tons per 24 hours	...	"
6	"	"	2-cylinder reversing	1270 diam. 1828 strike	50	9.0	...	1100	...	965	...	...	"	...	...	...	8.6	800 tons per 24 hours	...	"
7	"	3-high (cogging)	Single cylinder	1168 diam. 1594 strike	50	8.4	20	4000	...	840	...	...	"	...	...	...	...	715 tons per 24 hours	...	"
8	"	2-high	2-cylinder reversing	1267 diam. 1624 strike	100	8.75	...	4000	...	1016	1750	...	Electric	...	...	...	...	Billets 800 tons Slabs 550 tons	...	"
9	Carnegie Steel Co., Edgar Thomson Works	2-high	Compound with flywheel	1270 diam. 1880 strike	50	9.5	9.4	1480	3000	1016	1905	...	"	4 grooves	7	241 x 261	17	3700 in 24 hours	Rail mill 1	Ingots 440 x 670 at top, 470 x 680 at bottom x 1600 in 7 passes to 250 x 250 x 6410, 19 per cent. reduction.
10	Carnegie Steel Co., Ohio Works, Youngstown	"	Flywheel, 160 tons	1380 diam. 2262 strike	50	9.5	9.6	2250	5100	1092	2450	...	"	5 grooves	9	204 x 204	17	2000 in 24 hours	605 double two-high for rails and billets, and 260 mm. for continuous billet mill	Ingots 440 x 680 at top, 498 x 640 at bottom x 1600 in 9 passes to 200 x 200 x 9150, 19 per cent. reduction. Speeds 177 m. 180 g.
11	"	3-high	Two tandem	1143 diam. 1594 strike	max. 200	9.6	...	...	...	1016	2002	813	Electric	7 grooves	16	105 x 102	17	...	Continuous billet mill and section mill	"
12	Jones & Laughlin Steel Co., Pittsburg	3-high	Flywheel engine	1118 diam. 1594 strike	130 max.	...	...	5500	10,000	1016	2286	...	Hydraulic	...	...	...	...	...	Continuous billet mill and section mill	"
13	Jones & Laughlin Steel Co., Ohio Works, Youngstown	2-high	Two tandem compound	1118 diam. 1594 strike	130 max.	9.5	15.0	5500	10,000	1016	2286	...	Hydraulic	...	...	...	...	...	Continuous billet mill	"
14	National Tube Co., McKeesport	"	Direct coupled reversing engine	1270 diam. 1524 strike	...	...	...	...	...	840	2360	...	Electric	6 grooves 600 mm. 150 mm.	14-15	100 x 178	19	1910; 210,000; could roll more	"	"
15	Beckham Steel Co.	"	Double-tandem compound	1016 diam. 1574 strike	30 to 125	11.3	...	4000	10,000	1016	2440	1018	...	...	...	...	11	28,400 per month	Rail and section mills	"
16	"	"	Cogging Muller Gray Multiple Section Mill No. 71	1372 strike	...	...	...	...	...	...	...	...	...	...	...	...	...	...	"	"
17	Indiana Steel Co., Gary	(1) 2-high (1) 3-high	5 Cogging Mills for Rail and Bullets	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	"	"
18	Illinois Steel Co.	3-high	Flywheel engine	800 diam. 1524 strike	65	8.8	8 to 9	2200	3000	1016	2600	...	...	...	...	...	17 (max. 25%)	...	Rail mill No. 1	"
19	"	3-high	Two-reversing engine	1267 diam. 1594 strike	100 max.	9.6	20.5	1300	4000	1016	1680	265	Electric	...	...	...	10 (max. 20)	360,000 per annum	Section mill No. 1	"
20	American Steel and Wire Co., Newburgh Works	"	Reversing engine	1126 diam. 1624 strike	...	...	...	...	...	960	...	...	...	...	...	...	17	About 1000 per 24 hours	565 three-high timber mill	"
21	American Steel and Wire Co., Newburgh Works	"	Reversing engine	...	80	...	...	4000	...	960	...	...	...	...	...	...	16.6	...	...	"
22	Wagner Steel Co., Youngstown	"	Two-reversing engine	1270 diam. 1880 strike	150	...	...	...	...	840	2600	...	Electric	Three grooves barrel in middle	13	127 x 178	17	9000 in 24 hours	Continuous billet mill; 3 timber mills	"

TABLE I.—PARTICULARS OF BLOOMING MILLS IN THE UNITED STATES—DIMENSIONS IN METRIC UNITS

to the material being subjected for so long in one direction to the roll pressure.

The High American Blooming Mill Production

Summarizing all these facts, it appears that American blooming mills differ considerably from German ones both in point of construction and design and also in the method of working, but that the high rate of production is chiefly rendered possible by the very much simpler plan of rolling, which consists in rolling to larger sections, thus shortening the rolling period, and by the rapid and accurate handling of the auxiliary engines. The ingots are almost always heated in soaking pits which can take several ingots at one time. This is usual partly on account of the cheapness of fuel, and partly because the service of the mills being almost entirely automatic the ingots must be of a uniform temperature throughout.

Billet Mills

In proportion to the lightness of the finished product is the difficulty of preparing pieces of a suitable initial section. The use of a section rolled from a large ingot, as represented by the billet, dates in America from the year 1880. At first billets with a section of 4 x 4 in. were produced in the roughing rolls, and this practice led to the abandonment of 3-high mills in favor of the 2-high reversing type, on account of the unsuitability of the lifting tables for dealing with pieces of great length. Later the practice was further developed by the rolling of billets of a still smaller section, partly with a view of relieving the roughing rolls and partly for the purpose of lightening the work of the finishing rolls; also it was an advantage to roll down to as small a section as possible before reheating the billet, which in any case was necessary before sending it to the finishing mill.

The economy of having a set of rolls intermediate between the roughing rolls and finishing mill is apparent where there is a large market as in America, provided it is technically possible to construct a mill capable of taking the whole production of the roughing rolls and rolling it down in the same heat. It would be economically possible to roll 4-in. billets in the roughing rolls, but since these are designed for definite sections of large size their whole object would be lost if it were attempted to roll billets of any size under 4 in. square.

It is noteworthy that at first the endeavor was to roll from as large a section as possible direct down to the finished shape in one heat, and the introduction of the 4-in. billet marked a great advance, as compared with the 1½-in. billet, in the production of which two heats were required. Latterly the tendency is to revert to the billet of small section, the weight being kept up by making them very long. The Morgan mills, which work up 1½-in. billets, 30 ft. long, are now in great favor.

The semi-finished products of the roughing rolls, however, generally average about 6 to 8 in. square, and, for the production of small profiles and wire rods, these are rolled down into billets varying from 4 to 1½ in. square, for which, and also for flat bars, continuous billet and bar mills of eight to ten stands are almost always provided. Where the output is too small to make it worth while to install a billet mill, the ingot is rolled down further in the roughing rolls, as in the 2-high reversing mill of the Tack Company at Grand Crossing, where 1¾-in. square billets are rolled in the roughing rolls. To expedite the work, however, the piece after being reduced to 4 in. square is sent back over the roll without reversing, the engine meantime running away.

The only non-continuous billet mill (No. 10 in Table II) is the 3-high stand with 23-in. rolls of the American Steel & Wire Company at Newburgh, which rolls down pieces of 7 x 8 in. into 4-in. billets in seven passes. Also the billet and bar mills of the Carnegie Steel Company at Duquesne and Ohio are not continuous mills in the usual sense, but are converted rail mills, which, however, are very suitable for the production of large semi-finished products. A set of continuous rolls has been added in which billets of the smallest section can be rolled.

The billet and bar mill at Duquesne takes the material coming from the 38-in. 2-high mill in front and from the 28-in. 3-high mill, and rolls it down simultaneously into bars and billets or into fishplates and billets, the method

being as follows: The first piece, after one pass through the 21-in. 3-high billet mill, is cut straight into thick billets. The second piece, after one pass in the first stand, is also cut into billets, but each receives one pass in the second stand and are then taken direct to the continuous mill where they are rolled down into thin billets. The third piece is also cut up after one pass through the first stand, the resulting billets being then each passed once through the five following stands, and finished into fishplates or bars.

The converted rail mill at Ohio is also very suitable for rolling billets, since its construction as a double 2-high reversing mill gives it great adaptability to cope with the large output of the 43-in. 3-high roughing rolls. The production of this whole mill amounts to 3500 tons per 24 hr. The appliance for pushing the billets sideways is ingenious. The pusher works very rapidly, and in returning is lifted clear so as to allow the next billet to run under it.

Proportions of Rolls in Billet Mills

The roll diameter in the continuous mills is comparatively small, being seldom above 18 in. and in some mills not more than 14 in. Considerably less power is required, but this is more than compensated for by the losses in the trains of gearing. The small diameter entails a short length of roll, with only few grooves, which makes possible the use of very high pressures with safety. The average reduction of draft in continuous mills is always above 20 per cent., whereas the average reduction in the 23-in. 3-high mill of the American Steel & Wire Company is only about 16 per cent. The drafting is usually designed with the aim of reducing to a minimum or avoiding altogether the turning and up-siding of the piece between two stands.

The drafting for rolling bars is almost always designed to avoid up-siding. All the grooves are flat, and by the selection of a correct initial section, the desired width is obtained in the final closed pass, sometimes also by the use of vertical rolls behind the last stand. The two last passes of the bars are in such cases made through smooth rolls. The output of the continuous billet and bar mills corresponds to that of the roughing mill in front.

At Gary the production is 300 tons per hour of 4-in. billets and 150 tons of 1¾-in. billets. At Lackawanna the output is 70 to 80 tons per hour, but even that would be an unusual achievement in Germany. These results are obtained by driving the last stand at a comparatively high speed, 90 to 200 r.p.m., the first stand running at 9 to 12 r.p.m. On timing the speed of working, the author found that the time from the entering of the roughed down ingot between the rolls of the first stand and the entering of it at the last stand was ¾ min. and the rolling time of a whole ingot of 2½ tons and 7 x 7 in. was 2½ min. At the billet mill of the Ohio works the piece went through from the first to the last stand in 28 sec., the last pair of rolls being 15 in. diameter, and running at a speed of 200 r.p.m. The smallest billet section is 1½ in. and 8 in. is the uniform width for bars.

It is the almost invariable practice to cut both billets and bars with an electrically operated flying shears. They are cut into pieces of definite length and conveyed away at once by the live rollers behind the shears. The cooling proceeds in much the same way as here. At the American Sheet & Tinplate Company's works, however, a cooling drum is installed, measuring 95 ft. long and 8 ft. 6 in. diameter. This apparatus revolves very slowly and lifts the bars from the roller table of the shears and deposits them on the hot bed roller table, the bars cooling down all the time that they are being slowly carried round on the drum.

Rail Mills

In the United States in 1878 there were 11 works at which rails were rolled, the yearly output being 34,000 tons. In 1880 the number of works was the same, but the production had increased to 800,000 tons. At the present time, 32 years later, there are 14 rail-rolling mills, with a yearly output of about 3,000,000 tons. As the rate of production increased the cost naturally diminished, the greatest economy being due to labor saving. The cost of labor per ton fell from about \$3.20 at the end of the 'eighties to \$1.65 in recent years, wages remaining at nearly the same figure.

Reference Number.	Name of Company.	Type of Mill.	Number of Housings.	Drive.				Diameter of Rolls.	Finished Section, Kg. per Metre.	Section at Commencement, Millimetres.	Number of Passes.	Average Reduction per Pass.		Output.	Remarks.
				Type.	Number of Motors or Engines.	Cylinder Dimensions.	Speed.	Power.				Weight of Rail.	Per Cent.		
1	Lackawanna Steel Co., Rail Mill No. 1.	Two-high and Three-high.	6	Reversing Steam- engine.	3	1015 x 1524 1215 x 1371	Stands " " " " " " " "	I. and II. one engine. III. and IV. one engine. V. and VI. one engine.	39.7-49.6	470 x 470	15	39.7	22	2000 tons in 24 hours.	Two-high reversing mill. I. II. III IV. V VI Three-high mill. Three-high mill.
2	Lackawanna Steel Co., Rail Mill No. 2.	Three-high.	2	Steam- engine with flywheel.	2	1115 x 1219	70		6-32	Various.	12	Various.		70,000 tons per annum.	Three-high mill. Three-high mill.
3	Carnegie Steel Co., Edgar Thomson Works, Rail Mill No. 1.	Three-high. Two-high.	1 1 1	Steam- engine with flywheel.	1 1 1	1108 x 1525 1372 x 1575 752 x 1220	80 80 70	5000 H.P. 5000 H.P.	32.2-49.6	241 x 241	7 38 seconds. 50 seconds.	39.7	17	3696 tons per 24 hours as a maxi- mum.	Rolling on the Kennedy-Morris- System. 750 mm. 715 mm. 655 mm. Three-high Three-high mill. mill.
4	Edgar Thomson Works, Rail Mill No. 2.	Three-high.	3	Steam- engine with flywheel.	1				19.84-32.2	Ingots.					No information.
5	Edgar Thomson Works, Rail Mill No. 3.	Three-high. Two-high.	2 1 of each.	Direct current compound motor.	1 1	230-250 volts, 30 poles. 55.8 ton flywheel.	100- 125	Each 1500 H.P., light load, current 1200-1800 amps.	5.38-17.35	02 x 102 or 65 x 65	5 3	5-95 gross. 65 x 65	20	350 tons in 12 hours.	Three-high mill. Three-high mill.
6	Bethlehem Steel Co.	Two-high reversing. Three-high.	1 2	Twin tandem engine. Compound engine.	1 1	813/1421 x 1270 1117/1930 x 1524			Rails and structural sections.	198 x 198	5 5+1	39.7	18		Three-high mill. Three-high mill. Two-high mill.
7	Indiana Steel Co. Gary.	Two-high cogging. Two-high cogging. Three-high cogging. Roughing and Two-high No. 4 S. Two-high No. 1 H. Two-high Nos. 2, 3, 4.	2 2 1 3 1 3	Three-phase induction motors.	1 1 1 1 1 1		214 214 75 83 68 83	2000 2000 6000 6000		Ingots.	2 2 5 3+2 1 3	Total reduction for rails weighing 39.7 kg. per metre in 28 passes, 20 per cent.		4000 tons in 24 hours as a maximum.	No reheating type. Three-high mill. Three-high mill. Three-high mill.
8	Illinois Steel Co., Rail Mill No. 1.	Three-high. Three-high.	2 2	Steam- engine with flywheel.	1 1	1372 x 1676 1118 x 1676	70 70-80	3500 H.P. (built for 5000 H.P.) 2500 H.P.	29.8-49.6	203 x 203	9 Ingot 495 x 560.	29.8 kg. 39.7 kg. 495 x 560.	23 21 18 passes.	780,000 tons per annum.	Three- high cogging mill.
9	Illinois Steel Co., Rail Mill No. 2.	Three-high. Three-high.	2 1	Three-phase motor. 2200 volts, 25 cycles.	2 2	1-24 poles. 1-12 " " 1-24 " " 1-13 " "	120 and 80	1200 600 1200 600	Up to 43.2	203 x 203	3+2 2	39.7	26	80,000 tons per annum.	Three-high mill.

TABLE III.—PARTICULARS OF RAIL MILLS IN THE UNITED STATES—DIMENSIONS IN METRIC UNITS

Suspicion That Production Speed Affects Rail Quality

It is of interest to study the question of rails in connection with the increase in production. When a single rail mill, such as that at the Edgar Thomson works or at Gary, turns out from 3500 to 4000 tons in 24 hr., it is a question whether that amount of care is bestowed on the work which is desirable in view of the great importance of obtaining the requisite high quality in the finished rails. This supposition would seem to some extent to be confirmed by the fact that rail breakages in American railways are of much more frequent occurrence than in Europe, notwithstanding that for a long time past various commissions of rail manufacturers and consumers have been investigating the causes of this trouble, and have endeavored by various means to improve the quality. It must be admitted that the conditions of railway service in the United States are far more severe than with us, and that the loads and speeds have been very much increased since the 'eighties.

The carrying capacity of the railways has increased five times and the speeds have been nearly doubled, while the weight of rail has not been increased in proportion. The load of freight cars has risen from 10 to 50 tons, and the weight conveyed by a freight train has gone up from 500 to 600 tons to 3000 to 4000 tons. The axle-load of good locomotives is now 25 tons, as compared with 11.5 tons formerly. Speeds of 75 miles per hour have to be maintained daily between stops in order to make an average speed of 50 miles per hour. From these considerations it will be seen that the risk of breakages must have increased considerably, especially in view of the low temperatures sometimes prevailing during the winter months.

Proposals for the improvement of the structure of the metal by lowering the temperature at which the rails were finished and a specified permissible maximum contraction have not proved a sufficient remedy in increasing the resistance to shock and jarring. In 1903 the Rail Commission of the American Society of Civil Engineers received a pronouncement from a railway engineer-in-chief as follows: "The combining of the rail-rolling mills has resulted in a continuous deterioration of the rail material, and every effort must be made to counteract this tendency."

from 51,313 tons to 203,831 tons, or about 300 per cent. between 1909 and 1910, and the production of titanium steel rails increased from 36,250 to 198,535 tons, or by 440 per cent. (see Table IV). During 1908-1911, that is, three years after the first trials with titanium steel rails, 400,000 tons of such rails altogether have been laid at different times; the rails were rolled at the Lackawanna Steel Company's works, which make a specialty of such rails.

It is also noteworthy that at the Indiana Steel Company's works at Gary, open-hearth furnaces alone have been decided upon, from which it is clear that American railway engineers prefer open-hearth to acid Bessemer steel rails. At the same time the increase in the production of open-hearth rails is also in some respects due to the increasing scarcity of suitable ores for smelting Bessemer pig.

Treatment During Rolling

Naturally the treatment during rolling has a particularly important influence on the rail quality. The initial and final temperatures, the cross-section and length of ingot, the proportion of initial and final section to the number of passes, the roll-drafting and the treatment of the finished rails, all play an important part. One would suppose that in the course of years a certain standard might have been adopted which would form a basis of comparison, and would permit conclusions to be drawn as to the quality of the finished product. The temperature would of course be the first subject of observation.

In 1901 the Kennedy-Morrison process of rolling was in use at the Edgar Thomson works, which, by means of a special hot-bed, enabled the temperature of the rails to be lowered before the last pass. This would probably have but a slight effect in altering the structure or increasing the resistance to wear, considering that in the very short time allowed the cooling effect would not have penetrated uniformly to the internal metal of the rail. Moreover, the pressure in the last pass cannot be permitted in sufficient amount to influence the alteration of the structure throughout the whole section.

In the author's opinion a better solution of the ques-

Table IV—Production of Rails of Different Kinds of Steel

Production of Rails.	1907 Tons	1908 Tons	1909 Tons	1910 Tons	1911 Tons
Acid Bessemer steel rails, total.....	3,354,841	1,375,903	1,835,527	1,948,586	1,090,275
Including titanium steel rails.....			37,398	177,619	117,297
Open-hearth rails, total.....	256,747	576,381	1,276,056	1,743,353	1,703,754
Including titanium steel rails.....			13,915	26,212	38,141
Special steel rails, total.....			51,313	203,831	156,453
Including titanium steel rails.....			36,520	198,535	155,438
Including manganese steel rails.....			12,484	541	1,015
Including nickel steel rails.....			1,265	82	.....
Including electro steel rails.....			.....	4,277	462
Total	3,611,588	1,952,284	3,111,583	3,691,939	2,867,954

Lately a thorough inspection has been maintained at the rail mills by the authorities of 15 railway systems, with upward of 90,000 miles of track, and throughout the day and night shifts the work in the steel works, at the roughing mills, the rail mills, and testing machines is supervised by an engineer in each department.

Favor for Rails of Special Steel

The question as to whether the number of rail-breakages are due to inferior quality resulting from the rapid production on a large scale, in conjunction with the acid Bessemer process which has long held the field, or are to be attributed to the severe conditions of service, is a question which at all events is not yet solved. The fact is, however, noteworthy that the production of rails of special steel is now continually on the increase in the United States, and there has of late been a considerable decline in the output of acid Bessemer rails. In 1911 the production of Bessemer rails was only 1,156,852 tons as compared with 1,948,586 tons in 1910, or a reduction of 40 per cent. On the other hand, the production of open-hearth rails in 1909 was 121 per cent. greater than in the preceding year (in 1909, 1,276,056 tons, and in 1908, 576,381 tons). In the same manner the production of special steel rails rose

tion is to be found by paying regard to the number of passes and drafting, and giving attention to the temperature and pressures throughout the whole rolling operation. The shape itself and the distribution of the material have an important bearing on the cooling conditions.

Rolling Specification as Regards Temperature

The whole rolling operation, at least as far as regards temperature, might be better controlled if the specification required that the rail, after the final pass, should have a temperature corresponding to a definite longitudinal contraction, namely, for a 30-ft. rail of 100 lb. per yard a contraction should be allowed of $6\frac{1}{2}$ in., and $1/16$ in. less for each 5-lb. reduction of weight. Such rules would, however, only have some value if other points in connection with the construction of the rolling mill itself were taken into consideration. But the conditions of rail-rolling in the various American rolling mills differ so much, especially as regards the points which influence the final temperature, such as initial and final section, number of passes, and the relation of these to one another, that even an approximate basis of comparison is impossible, and consequently any such rules would be absolutely useless.

Divergence in American Rail Rolling Practice

In illustration of some great divergences in rail-rolling practice at American rolling mills, some data have previously been published* relating to the ratio of the initial and final section to the number of passes, which permit a comparison with German rail-rolling practice. The figures are taken from reports of a commission of rail manufacturers and railroad engineers, but the most important data concerning temperature and rolling period were never included, whereas a number of other particulars concerning shrinkage and amount of discard seem to the author to be of little value. To standardize the amount of discard is beside the mark, not only on account of the many conditions which influence segregation, but because every ingot requires individual treatment according to the depth of the pipe, which must at all costs be cut out. If the conditions of manufacture permit that the price may be increased according to the percentage of discard, this may have the effect of a premium for the steel works which took no interest in the improvement of its ingots or in the reduction of pipe. In German practice the elimination of piping is practicable, and can be perfectly performed; the end surfaces are milled, thus allowing any defects to become visible. Such defects are not revealed by an ordinary saw-cut alone, as practiced in the United States.

It is clear, however, that it cannot be immaterial whether a comparatively hard material is rolled down to its final shape in 30 passes with a reduction of 12 per cent. in section at each pass, or in 15 passes with a 23 per cent. reduction. The finishing temperature is bound to be enormously influenced by the number of passes and the reduction of draft, thus proving the uselessness of taking the contraction as a guide for the finishing temperature; moreover, the structure of the steel, especially at the lower temperature required in the case of the harder kinds, suffers through the too severe squeezing of the metal.

The comparative figures given in Table V for American and German rail-rolling mills show a much greater uniformity in favor of the latter, which entirely confirms the foregoing considerations. The German figures besides show a smaller average reduction of draft for the roughing passes and all the succeeding passes.

The nine rolling mills summarized in Table III show in their construction and arrangement that the requirements for a high production are fulfilled by dividing up the whole mill into a series of subsidiary trains, each of which is independently driven. This subdivision led to the wide adoption of 3-high stands, which developed further into non-reversing 2-high stands in which one pass only is made. In this connection appears also the contrast with German and English conditions, where the reversible 2-high mill is still preferred, and of necessity, because the mills are not built with the sole object of rolling rails, but have to deal with a much wider range of material, and the capacity reached by subdividing the mills could not be fully utilized under the market conditions of Germany and England.

The disadvantages experienced in a large plant built for making a special class of material, in not being able to utilize their full capacity, may be realized from the fact that the Gary works in 1911 turned out 286,492 tons of rails, or 10 per cent. of the whole rail production of the United States, and in the previous year 443,000 tons, or 12 per cent., were manufactured. But the capacity of the Gary works is about 1,200,000 tons yearly, so that in 1910 the output was 37 per cent., and in 1911 only 24 per cent. of the total capacity. Assuming that 500 shifts were worked, the production per shift for 1910 was about 880 tons, and for 1911 about 570 tons, which, though large, is but a small proportion of the maximum capacity of 2000 tons, and might have been attained with much simpler appliances in an ordinary German rail mill.

The number of stands varies according to the whole lay-out of the rolling mills and to the initial section of the ingot, and as the number of passes made in one stand is reduced the length of roll and diameter diminish. The variations in the diameter are apparent from Table III.

A simple subdivision of the mill into two or three 3-high stands, or two 3-high stands and a 2-high behind

Table V—Comparative Practice of German and American Rail Mills

No. taken from Table III*	Weight of Rail	Average reduction per pass roughing rolls	Total number of passes	Average total reduction per pass
		United States		
	Kilogrammes	Per cent.		Per cent.
1	39.7	24	15	22
3	39.7	20	19	19
6	39.7	..	..	..
7	39.7	21	18	20
8	39.7	19	18	20
9	39.7	19	16	22
A	36.3	..	30	13
B	36.3	..	27	14
C	38.5	..	18	19
F	38.5	..	29	13
G	38.5	..	18	19
H	36.3	..	15	23
I	40.8	..	24	15
J	34.0	..	26	15
L	38.5	..	24	16
M	27.2	..	22	18
Average,		20	21	18
		Germany		
	Kilogrammes	Per cent.		Per cent.
A	41.0	9	28	14
B	33.4	10	31	13
C	45.9	13	24	15
D	33.8	13	24	15
E	41.0	12	24	15
F	33.4	12	24	15
G	45.9	12	24	14
H	41.0	11	30	12
I	33.4	11	30	13
J	33.4	11	28	13
K	20.0	11	30	13
L	30.0	13	22	15
Average,		12	27	14

one another, as commonly practiced in Germany, enables continuous rolling to be carried on to a certain extent, and makes an increase in output possible, provided that by exact automatic working, as at the rail mill No. 1 of the Edgar Thomson works, several pieces can be rolled simultaneously.

Concerning the rail mill of the Indiana works, it is scarcely necessary to describe this here, as it has already frequently been described elsewhere. With regard to the draft, however, it may be mentioned that the ingot section is 20 x 24 in., and it is rough rolled in nine passes to about 8 x 8 in., and finished off in nine more passes without reheating. The average reduction of draft in the first nine roughing passes is 21 per cent., which must be regarded as very high; in German roughing mills 15 to 17 passes would be required for this work. It should be noted that the two first roughing stands only run at 6 r.p.m., and the third and fourth stands at 10 r.p.m. The shape of the grooves indicates the tendency to reach the finished profile as soon as possible, and the reductions of section are very considerable.

The rails are cut to length by several saws operated together, by means of which a sufficient degree of accuracy is reached without the necessity of milling. By the omission of milling a great economy is obtained. The only machining operations to be performed after rolling and cutting to length are the straightening and drilling of the rails. Presses are mostly used for straightening, and the roll-straightening machine is rarely seen, though in common use in Germany. The drilling machines are generally fitted with three spindles.

A newspaper dispatch states that the furnace of the Lebanon Valley Furnace Company, known as the Meily furnace, Lebanon, Pa., and operated some time ago by the Edgewater Iron Company, in which E. Burd Grubb was interested, is to be operated after an idleness of several years, by a new company known as the Lebanon Blast Furnace Company. In the early summer John S. Kennedy, formerly with the Musconetcong Iron Works, Stanhope, N. J., and J. J. Mohr Company, Philadelphia, were interested in forming a company to operate this furnace, but these negotiations were given up some time ago.

No. 1 Crane furnace of the Empire Steel & Iron Company, Catasauqua, Pa., was blown out September 28, the lining of the stack being in unsatisfactory condition. The furnace was on low phosphorus iron. It will be relined and repaired at once. This company is now considering the blowing in of its furnace at Macungie, Pa.

*Stahl und Eisen, 1908, p. 743; *The Iron Age*, 1908, p. 855.

*See also Stahl und Eisen, 1908, p. 743.

An Unusual Coal Handling Device

In connection with the new plant of the Curtis Publishing Company, Philadelphia, Pa., there has recently been built at Eleventh street and Washington avenue a warehouse for the storage of paper and other raw material. On the north side of the building there is a space measuring approximately 80 x 160 ft. which is used for the storage of coal. Some of this fuel is consumed at the warehouse, but the greater part of it is teamed to the company's publishing house at Sixth and Walnut streets, where there is no railroad siding. In order to store the maximum quantity of coal on the lot, which is not quite rectangular in form, Frank K. Roberts & Co., Philadelphia, Pa., the architects for the building, decided to make the peak line of the pile about 16 ft. from and parallel to the wall of the main building and to hang the storing conveyor on steel brackets attached to the building columns. The advantage of this construction is that none of the structural work comes in contact with the coal, which is washery buckwheat and is often acidulous and consequently corrosive.

This conveyor, which was installed by the Link-Belt Company, is 54 ft. above the floor of the storage area and some idea of the depth of coal pocket can be secured from the accompanying engraving. By using the bulkheads along the railroad siding about 11,000 tons of coal can be stored on the lot. Coal is taken out of storage by two conveyors in concrete tunnels at the bottom of the pile.

track hopper with a chute leading directly to the elevator so that the coal can be put into the 150-ton bin without running either of the conveyors in the tunnels.

The McCrum-Howell Reorganization

The reorganization of the McCrum-Howell Company is one of the most drastic in a long time. The company had a capital stock of \$7,000,000, half preferred and half common. The new company will have an authorized capital stock of \$1,575,000 7 per cent. cumulative preferred and \$3,150,000 common stock, making a total of \$4,725,000. Holders of outstanding preferred stock will be required to pay an assessment of \$16 a share, and of common stock \$8 a share. They will receive one share of new preferred and one share of new common for each six shares of preferred stock now held and the payment of \$96 in cash. Holders of common stock will receive for each twelve shares now held and the payment of \$96 in cash one share of new preferred and one share of common.

The Creditors' Committee states that its investigations have disclosed that if the property be disposed of at a forced sale the creditors can realize but a small percentage of their claims, but the business appears, from the reports of engineers and accountants, to have an earning power which is estimated, after making certain improvements, at \$200,000 a year minimum. The committee has made an arrangement by which creditors who are unwilling to accept securities of the new company may receive 25 per



A Somewhat Unusual Installation of Coal Handling Machinery Employing Overhead and Undercath Conveyors Made by the Link-Belt Company, Chicago, Ill.

These tunnels are also clearly shown in the accompanying engraving, one being at the center, while the other is at the left adjoining the railroad siding. The internal dimensions of these tunnels are 6 ft. high x 5 ft. wide. There are hand-operated gates on each side to feed the fuel to the conveyors which have thickened edge flights on a single strand of Link-Belt and deliver to the lower run of a gravity-discharge elevator conveyor that has steel buckets on two strands of roller chain. From the conveyor the fuel is discharged through gates in the upper run into a concrete bin which holds about 150 tons. From here it flows through cut-off gates into the trucks which haul it away. If desired the coal can be dumped to storage at any point of the railroad siding, but there is a

cent. of the face value of their claims in cash. Those who will take the securities will receive 25 per cent. of their claims in new preferred and 75 per cent. in new common stock.

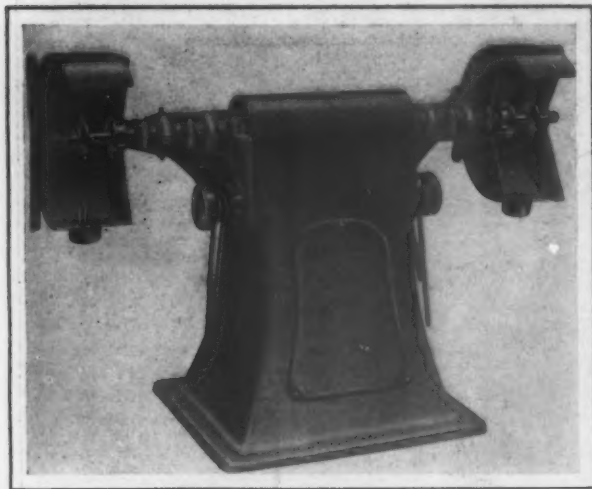
The Bankers' Trust Company, New York, announces that under the terms of the mortgage of the Sheffield Coal & Iron Company to it as trustee and a request signed by the holders of over 75 per cent. of the outstanding bonds secured by this mortgage, it will sell at public auction October 30 the following property secured under the mortgage; 995 shares of stock of the Wise Terminal Company and \$35,000 of the first mortgage 6 per cent. bonds of the same company.

Double Arbor Polishing and Buffing Machine

A special design of polishing and buffing machine which consists of two independent lathes in one has been brought out by the Excelsior Tool & Machine Company, East St. Louis, Ill. The distinctive features of the machine are a unique design, handiness of operation, simplicity and large capacity.

As will be noticed from the accompanying engraving the entire machine is inclosed by dustproof covers and there is a solid bracket for attaching the dust hood shown. All the appliances are confined in place and only one wrench is required in making any changes. The spindles are driven from two pulleys underneath the machine. The diameter of these pulleys should not exceed 30 in. and the face is 6 in. wide. The approximate speed of operation is 300 r.p.m., although this can be varied slightly if necessary. While the driving belt is ordinarily led up through the base of the machine, at the same time it is possible to have the belt run over the countershaft above the machine. The arbor heads are raised and lowered by an eccentric and are clamped at the desired height by a special nut having handles. In operating the machine it is simply necessary to raise the arbor head and tighten this nut, while the spindle is stopped by lowering the head. This causes the pulley to rest on a friction block which stops it instantly. The spindles are made of high carbon tool steel and are finished by turning and grinding.

The oil reservoirs of each spindle are connected with pipes and a drain cock will indicate the proper amount of oil to be used when it is opened. Each machine has six oil reservoirs with the same number of automatic chain feeds, thus keeping the spindles thoroughly lubricated. Separate drains are furnished for the oil wells. This type of construction, it is pointed out, does away with any delay in the changing of the wheels and the use of loose pulleys which have to be oiled. Belt slippage is also eliminated and there are no oil-soaked belts to tighten or



The No. 25 Double Arbor Polishing and Buffing Machine Built by the Excelsior Tool & Machine Company, East St. Louis, Ill.

repair. By the use of two separate arbors, should the wheel on one arbor get out of balance, there will be no effect on the opposite one.

The following table gives the principal dimensions and specifications of the machine:

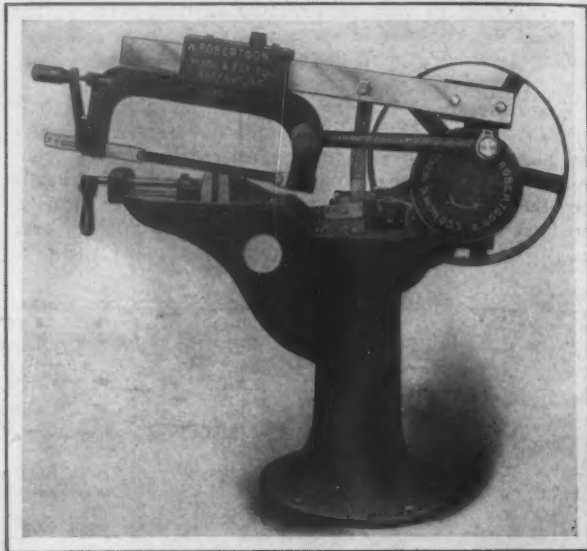
Total length of spindles, in.....	64
Length of spindles between collars, in.....	50
Distance from floor to spindle center, in.....	32
Maximum diameter of spindle, in.....	1 3/4
Diameter of spindle at wheel end, in.....	1 1/2
Maximum diameter of polishing wheel, in.....	18
Maximum face width of polishing wheel, in.....	4 1/2
Length of outer bearing, in.....	14 1/2
Length of inner bearing, in.....	4
Diameter of driving pulley, in.....	5 1/2
Face width of driving pulley, in.....	4 1/2
Width of driving belt, in.....	4
Weight of machine, lb.....	950

The equipment of the machine includes dustproof collars for the spindles and a wrench for adjusting them.

An Improved Power Metal Saw

For use where floor space is an important consideration the W. Robertson Machine & Foundry Company, 32 Greenwood place, Buffalo, N. Y., has brought out a new type of power hack sawing machine which it designates as its Economy No. 1 saw. As compared with the No. 2 machine which was illustrated in *The Iron Age*, May 30, 1912, the capacity of the machine is smaller.

In general construction the design is the same as the various other machines built by this company, the object being to secure fast and accurate cutting. The tool operates on the draw stroke with the builder's mechanical lift on the idle or return stroke, and has a quick-starting clutch with an automatic stop which operates when the cut is completed. The design of the base is compact, the



The No. 1 Economy Power Saw for Cutting Metal Built by the W. Robertson Machine & Foundry Company, Buffalo, N. Y.

floor space occupied measuring only 14 in. The frame is mounted on a finished steel guide bar at the center of the top and is driven from the center of one side by a connecting rod. It has a bearing measuring 7 x 2 in. and an adjustment for wear. The machine has a capacity of 4 1/4 in. in the vise and the driving pulley is 15 in. in diameter with a 2 1/2-in. face. The machine uses 10 or 12-in. blades and weighs when complete 180 lb.

Duplex Metals Company Improvements

The Duplex Metals Company, Chester, Pa., has awarded contracts for an addition to its coating department for making copper-clad steel products. A building will be erected, 100 x 100 ft. In it two 25,000-lb. and four 10,000-lb. rotary copper melting furnaces will be installed. Two additional 10,000-lb. rotary furnaces will be installed in the present coating department. The steam engines now operating the 10 and 12-in. rolling mills are to be replaced by motor drives. Two continuous heating furnaces, having a capacity of 100,000 lb. per 10-hour day, are also to be built. These various improvements and additions to equipment will almost double the capacity of the plant. As the coating departments will be operated as separate units, either can continue in operation should the other be temporarily idle.

The Rateau Steam Regenerator Company, 140 Cedar street, New York, has been awarded an order by the Inland Steel Company, Chicago, for a complete equipment of Rateau steam regenerators which will handle the exhaust steam from two mill engines and will deliver the steam to two low pressure turbines of 2000 kw each.

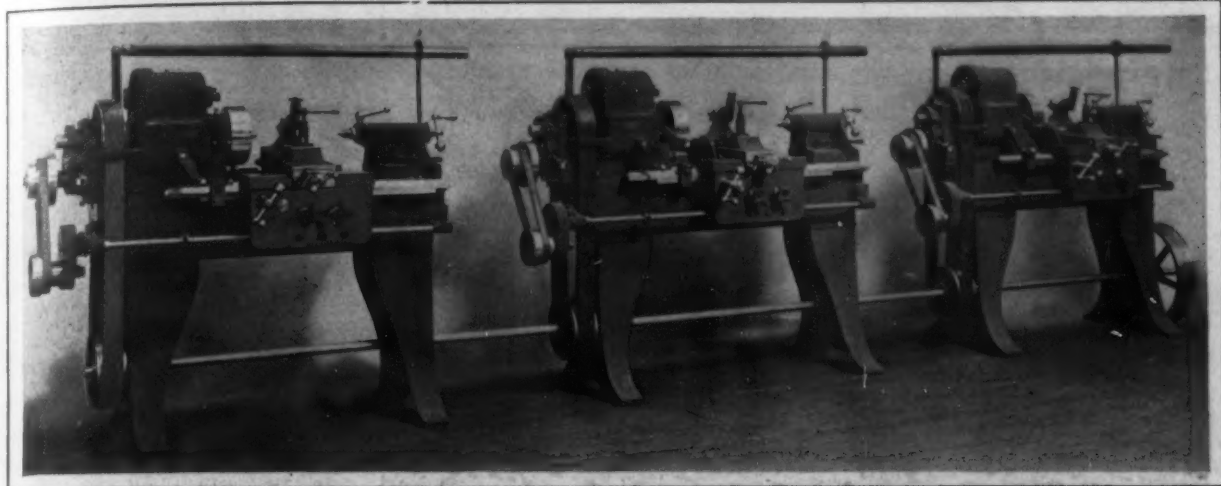
Willett & Burr, contractors on the Sierra & San Francisco Power Company's dam near Sonora, Cal., have placed an order with the Orenstein-Arthur Koppel Company for two locomotives and 16 cars of the new four-yd. all-steel type.

A Group of Special Lathes

Recently the Whitcomb-Blaisdell Machine Tool Company, Worcester, Mass., has built groups of the single-pulley drive 14-in. special manufacturing lathe arranged for motor drive. This machine is designed to be driven

A New Pump Valve

A new type of pump valve designed along different lines from the ones now on the market has been developed by Witting Bros., Ltd., London, the American representative being Louis A. Freedman, 135 West Eighty-sixth



A Group of 14-In. Special Manufacturing Lathes Having a Single Driving Pulley Built by the Whitcomb-Blaisdell Company, Worcester, Mass.

directly from the main lineshaft, unless an exceptional number of speed changes are required and in the new arrangement a jack shaft is substituted, the lathe headstock being cored out to permit the passage of the driving belt. This type of lathe is designed to secure the utmost simplicity. The driving pulley is loosely mounted on the spindle and is engaged by a friction.

Thomas Towne, Union Drawn Steel Company

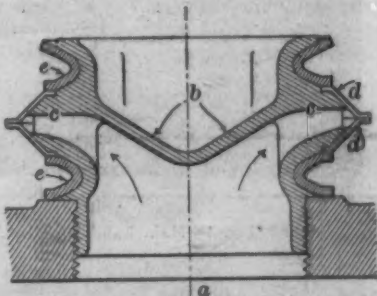
Thomas Towne was appointed October 1 general manager of sales of the Union Drawn Steel Company, Beaver Falls, Pa., with headquarters at Beaver Falls. This is a well-earned promotion. Mr. Towne was born July 2, 1867, and entered the employment of the Orange County Furnace, Middletown, Orange County, N. Y., in 1882. He engaged with the Garvin Machine Company, New York City, in 1887 and became associated with the Union Drawn Steel Company as Eastern sales agent November 1, 1891. This last position he has held for 21 years and has had a longer tenure of office as American mill representative than any other sales manager at present in New York City, except perhaps one. He is a member of the American Society of Mechanical Engineers, the International and American Societies for Testing Materials and the Iron and Steel Division of the Standards Committee of the American Society of Automobile Engineers.

The Newport Warehouse-Independent Terminal Company, whose organization at St. Louis was recently reported, under the promotion of W. J. Holbrook, of the Holbrook-Blackwelder Real Estate Trust Company, has completed plans and is applying to the municipal assembly of St. Louis for a franchise to establish independent railroad terminals covering about 20 city blocks, to be equipped with buildings and all modern mechanical devices for the rapid handling of freight. The plans are modeled after the Bush terminals in Brooklyn, N. Y.

The New York State Steel Company, Buffalo, N. Y., is preparing to operate again its open-hearth furnaces which have been idle for a good many months. The blast furnace has been running since April, and the foundry iron product has been marketed by B. Nicoll & Co., 149 Broadway, New York. This firm will also act as selling agent for the billets which the steel plant will soon be producing.

The Sharon Steel Products Company, Sharon, Pa., has placed the contract for the steel work of its new plant to the Riverside Bridge Company, Martins Ferry, Ohio. There will be a main building 50 x 400 ft. and another building 50 x 175 ft.

street, New York City. In the older type of valve a passage of annular form is alternately opened and closed by a body of corresponding shape, and during the closing of the valve the direction in which this body moves is contrary to the flow of the water. This arrangement works to increase the difficulty of closing the valve and requires the use of valve loads or springs. While these loads serve to prevent a retarded closing of the valve, at the same time it is pointed out that they offer a resistance to the direct flow of the water and a consequent reduction in the suction and delivery height of the pump. In the design of this new valve it is claimed that these objections have been overcome by the use of this special construction.



An Improved Type of Pump Valve Employing Sheet Metal Valve Rings

This new valve, which is known as the H. B. valve, consists of an unmovable body, *b*, and the movable valve rings *d*. The latter, which are made of sheet metal varying from 1/16 to 3/32 in. in thickness cover the annular orifice *c* when the valve is closed so that their outer edges form the proper seat for the valve. These rings are spun and have such a shape that when not working they rest against the body of the valve. The spring load which is required for these valves is supplied by the V-shaped rubber rings *c* that are laid with slight tension into corresponding grooves of the body and which press the metal rings tightly against each other. One of the special features of the valve is the way in which the fluid is guided through it, since after entering at *a* it is gently deflected in a radial direction toward all sides and leaves the valves through the orifice *c*.

This construction also enables multi-stage valves to be arranged with large through flow areas on comparatively small bases. As the valve rings move in opposite directions, every single one has a low lift; for example, with a slot opening of 3/16 in., each ring only moves 3/32 in. This, it is emphasized, makes the valve capable of being adapted to high speed pumps where they will work smoothly and noiselessly. The position of the valves, it is also pointed out, does not affect their operation, it being possible to arrange them either horizontally, vertically or at an intermediate angle without any danger of jamming.

The American Society of Engineer Draftsmen

The annual meeting of the American Society of Engineer Draftsmen was held in Teachers College, Columbia University, New York, on the evening of October 1. President E. Farrington Chandler displayed a unique chart showing that the society had quadrupled in the past year.

Safety Provisions at Steel Works

The American Iron and Steel Institute's Exhibit at the International Health Congress

Perhaps the most interesting of all the groups at the health exhibition held at Washington recently in connec-



Fig. 1—Main Exhibit of the American Iron and Steel Institute at the International Health Congress at Washington

It was announced that the members had secured, by voluntary subscription, the latest pattern stereopticon-projectograph for the purpose of illustrating lectures at its meetings. A highly constructive programme was adopted for the coming year, which included the establishment of a mutual benefit section, involving a form of insurance.

The election of officers resulted as follows: Prof. Charles William Weick, Columbia University, president; William B. Harsel, first vice-president; Charles A. Clark, Crocker-Wheeler Company, second vice-president; C. B. J. McManus, third vice-president; L. T. Maenner, Missouri Pacific Railroad, fourth vice-president, and E. F. Chandler, Henry L. Sloan and C. W. Fleming, Board of Governors. Walter M. Smyth, 116 Nassau street, New York, is secretary.

The growth of manufactures in the South is well indicated by the statistics of cotton supply and distribution for the cotton year ended August 31, 1912, issued by the Census Bureau. The cotton growing States in that year used 2,712,622 bales, against 2,655,049 bales in all other States of the union. This was the first time in the history of the cotton industry that the amount of cotton spun and woven in the South was greater than that so used in all other States in any one year. The number of active spindles operated increased almost 500,000 over the number operated the previous year.

J. R. Cohn, secretary of the National Iron & Steel Company, Houston, Texas, closed a contract September 25 for 2500 tons of 60-lb. steel rails with the Louisiana Pacific Railroad, now building a branch line from Lilley Junction to Juanita, La. This is one of the largest sales of steel ever made in that locality. The rails will come from a mill in Pennsylvania.

tion with the Fifteenth International Congress on Hygiene and Demography was that on Industrial and Occupational Hygiene. The health exhibition was held for three weeks in a building especially erected for the purpose. It was under the general direction of Dr. J. W. Schereschewsky of the United States Public Health Service. The exhibits were arranged in 13 groups as follows:

1. Vital Statistics and Demography.
2. Growth and Nutrition; Food.
3. Hygiene of Infancy and Childhood (including Prevention of Infant Mortality and School Hygiene).
4. Physiology and Hygiene of Exercise.
5. Housing.
6. Industrial and Occupational Hygiene.
7. Communicable Disease.
8. State and Municipal Hygiene.
9. Care of the Sick; Life Saving.
10. Hygiene of Traffic and Transportation.
11. Military, Naval and Tropical Hygiene.
12. Sex Hygiene.
13. Mental Hygiene.

The group on Industrial and Occupational Hygiene occupied a whole wing of the exhibition building. In this were many very attractive exhibits. The most artistically arranged was that of the National Cash Register Company, Dayton, Ohio. But the exhibit which most surprised and impressed visitors was that of the American Iron and Steel Institute. The space originally reserved for it was spacious, well located and well lighted. But the amount of material was so large that it became necessary to secure supplementary space near by. Those in charge of this exhibit seemed never to weary in answering questions asked by visitors from other countries and from all parts of the United States. The wall space was covered with framed pictures while unframed pictures were shown on display fixtures, and on floors and shelves were models of appliances, all illustrating the care exercised by iron and steel producers for the health and safety of their employees.

The American Blower Company of Detroit, Mich., exhibited a working model of its mine ventilating outfit, while the Empire Steel & Iron Company showed a working model of its mine signal system and many photographs illustrating all the safety devices in use at its iron mines and blast furnaces. The Norton Company, Worcester, Mass., exhibited a full size grinding wheel with its safety operating stand. Fine housing conditions were shown by photographs exhibited by the Jones & Laughlin Steel Company, the Maryland Steel Company, the Cleveland-Cliffs Iron Company, the Thomas Iron Company and others. A set of photographs shown by the Bethlehem Steel Company revealed model yard conditions about its mills. The Lackawanna Steel Company had three sets of photographs showing provisions for safety in the mills and interest in the home conditions of the men. The Pennsylvania Steel Company exhibited 20 photographs showing safety devices used in and around its mills. The American Steel Foundries exhibited safety appliances and photographs. The method of arranging views and data in the exhibits is shown in the accompanying reproductions of photographs.

About one-half of the total exhibit was furnished by the United States Steel Corporation and its subsidiaries. Its danger signals, using the large red disk as a symbol understood by the people of all countries, were shown on the walls, and models of its safety appliances were exhibited on shelves and tables. The Oliver Iron Mining Company showed photographs and models illustrative of protection to its men in blasting and mining in the Lake Superior district. The Frick Coke Company showed by means of framed pictures how its miners secure health and profit by making vegetable and flower gardens. The National Tube, Carnegie Steel, Illinois Steel, American Bridge, Tennessee Coal & Iron & Railroad companies and other subsidiaries of the United States Steel Corporation showed by means of large photographs the care and attention which they are giving the health and comfort of their men. This is the

The Connecticut "Blacklist" Law

The Supreme Court of Connecticut has decided against the secretary of the Hartford Manufacturers' Association in the case brought to test the constitutionality of the act of the last legislature known as the "blacklist" law. Charles H. Lay, the secretary, was arrested in a friendly suit for refusing to give the commissioner of the bureau of labor statistics access to its records. The lower court found the defendant guilty, and the case was appealed. It will now go to the United States Supreme Court. The law provides that no bureau or agency shall be conducted for the purpose of preserving and furnishing to any member thereof or to others information descriptive of the character, skill, acts or affiliations of any person whereby his reputation, standing in a trade, or ability to secure employment may be affected, unless a complete record of such information shall be open at all times to persons affected or their agents and to the commissioner of the bureau of labor statistics.

The American Institute of Mining Engineers

The 103d meeting of the Institute, for the reading and discussion of professional papers, will be held at Cleveland, Ohio, beginning on the evening of October 28. The list of papers on iron and steel subjects is unusually long and varied. The provisional programme provides for sessions on October 29, 30 and 31, and for trips to various points of interest in the Cleveland district.

The influence of pouring temperature on the tensile strength of manganese bronze was brought out in a paper of that title by H. W. Gillett, Aluminum Castings Company, Detroit, Mich., presented to the American Institute of Metals at its recent annual meeting in Buffalo, N. Y. In general, the results of the tests showed that the tensile strength of an alloy increases with decreasing pouring



Fig. 2—Method of Illustrating Safety Provisions at Steel Plants

first time that the American Iron and Steel Institute has attempted to get together an exhibit showing the activities of its members in welfare work, and the quality of the exhibit was both surprising and gratifying. Most of the things shown at this exhibit are to be given to the institute for display in its permanent museum at its headquarters in New York.

temperature, which gives quicker freezing and hence smaller crystals and closer grain. In tests on some 40 alloys of aluminum with copper and zinc in various amounts it was found that an alloy poured at 1500 deg. F. will not have over 90 per cent. of the tensile strength of one poured at 1300 deg. The best pouring temperature for heavy castings was placed at 1950 to 2000 deg. F.

Education in Accident Prevention*

BY MELVILLE W. MIX.†

With the development of the new doctrine of indemnity in the case of occupational accidents, which disregards the assumption of risk, negligence of fellow employees or contributory negligence as defenses to the employer, it becomes necessary to consider the question from a purely educational standpoint, establishing collaterally therewith the doctrine of prevention of accidents.

Average Individual Prone to Take Chances

In nearly every large establishment some special thought is being given to the safety of employees. As a result, such employees are becoming aroused to the necessity of looking out for their fellow-workers and themselves. The average individual, at work for himself or in pursuit of his own happiness, will take more chances with his life and limb than it is necessary for him to take in any employment even as the state of protection stands today. There will be no change in this popular disregard for personal safety until there is an established public conviction, an active, yet sub-conscious state of mind that automatically thinks of "safety first."

No employer designedly exposes his employees and, on the other hand, it may be said that few workers purposely put themselves in harm's way. Years of education and sad experience have taught even the most heedless of men owning property that it pays to prevent fires. Such precautionary measures with reference to fires are second nature to most people, and the same thought must be created in behalf of accident prevention. The same relation must exist in all minds with reference to accidents as exists with reference to contagious diseases.

It will be the work of a generation and perhaps two generations to bring every one to this state of mind. The education should commence from the cradle, be carried through the public schools and then to the occupational field. All classes must be made to recognize its force from a standpoint of preventing waste; just the same as sickness is now being regarded. There will always be indifference, yet this may be largely overcome if the teachings are sufficiently impressive and started early in life. It is a case of drill, DRILL, DRILL.

Just now the railroads, mines and manufacturing establishments are receiving the principal attention of the social welfare workers, and especially of the stump speakers; presumably this is because of the larger units represented, and the attraction of a "shining mark." But with this doctrine recognized as one of universal responsibility, it means that the entire public will be affected and must become aroused to the importance of a wise and equitable basis for dealing with the situation.

Non-Manufacturing Occupations Also Involved

Heretofore, such employers as agriculturists, horticulturists, the small tradesmen (such as building contractors, involving a variety of craftsmen), employers of domestic labor, etc., have given but little heed to the progress of this question. It goes without saying that they will eventually become involved in its workings, because—man for man employed, or dollar for dollar of wages paid—the aggregate of these employments far exceeds those of the factories, and there can be no doubt of their ultimate responsibility under any employers' liability or workmen's compensation act.

In none of these trades or occupations are there the same elements of protection to the workers. Take the farm as an example—the machinery is more dangerous than factory machinery, the work conditions are more hazardous, man for man, and less attention is paid to the prevention of accidents. There is also lacking the fine discipline of an organized factory, and men take more personal chances every day. In Germany, statistics show that nearly 45 per cent. of the occupational accidents are in agricultural and horticultural pursuits, which demonstrates beyond doubt the need for covering this field.

The same criticism as to exposure and protection may

be made of the minor trades, where the number of employees per establishment is small and supervision is uninformed and correspondingly limited. The working of the present laws, in a number of States, attaches a serious burden to the small employer, and it is, in fact, becoming a hardship for such employers to get labor on account of the lack of responsibility in case of accident, and this condition will be accentuated as time goes on. Insurance of some kind must be provided wherein the individual risk will be spread over the entire trade and be made compulsory.

Proper Standards Must Be Established

In addition to a national campaign of education, what is now needed is a uniform nation-wide standard of protection to workers in the various lines of employment, and coupled with it must be provided a highly developed form of standard factory inspection with appropriations of sufficient size to insure competent and ample assistants, with provisions for complete statistics on all work accidents. At the present time, we must work more or less in the dark until proper standards may be established. In this we may receive much benefit from Germany, where are maintained, as public records, full statistics on all trades and in all subdivisions of the empire. German standards of protection may not be suitable for us, but they may at least form a basis from which our own standards may be developed to suit our particular conditions, both in individuals and in occupational environment.

The Manufacturers' Bureau of Indiana has given much time and thought to accident prevention and workmen's compensation, and it firmly believes that any movement that does not include all employments will eventually fail and that the greatest relief will be found in inaugurating a campaign of education throughout the State on accident prevention and requesting a more complete system of State inspection and statistics than we now have, covering all employments, regardless of size or kind.

Dodge Mfg. Company's Plan of Safety Competition

In order to bring this matter of safety directly to the employees of the Dodge Mfg. Company, the management has prepared a plan of education and competition between departments and their foremen. This is in the line of a percentage score board, such as indicates the standing of teams in the baseball leagues. The starting point is 1000. Each division is penalized according to its accidents; minor accidents of less than one day's absence not as yet being considered. Each day's absence bears a percentage charge in proportion to the total number of men-days per month in each division. The foremen of all of the divisions scoring 1000, or those holding the first three places below 1000, will receive prizes of personal interest each month. The foreman scoring the largest number of first monthly prizes for one year will receive a special prize at the end of the year. All divisions holding a percentage for the year of 1000, or the highest annual percentage, will receive two days' pay extra.

This plan is in rather a crude form at present, but it will be of daily interest, because of its competitive nature, and will facilitate the inculcation of preventive measures and of individual care and forethought, as well as speedy and prompt attention to reduce the severity of the accident and shorten the time of absence. At all events, the interest in the daily score board, which is 24 ft. long, and erected at the main works entrance, will afford a splendid vehicle for carrying influence to the worker. Each week a spirited or expressive motto will be placed at the head of the board that will surely have an excellent effect on the daily thoughts of the workers.

The slogan must be "education" in order to produce in the individual mind an automatic, sub-conscious, ever-present thought to "look out for yourself first and the other fellow always." Safety committees are good things, but they do not go far enough. They must educate the worker, the foreman and the official. All must be thinking of the subject. Every individual must be a committee unto himself and do so from the standpoint of real interest in preventing accidents, stopping waste, suffering and disability to his fellowman. When the whole factory or the whole field of workers will so regard accidents, the problem will have been solved. In the language of a famous advertiser, "Eventually, why not now?"

*An address at the Accident Prevention meeting of the Conservation Congress, Indianapolis, October 2.

†President Dodge Mfg. Company, Mishawaka, Ind.; president Indiana Manufacturers' Bureau, vice-president National Association of Manufacturers and a director National Society for the Promotion of Efficiency.

New Publications

The Metallography of Iron and Steel. By Albert Sauveur, professor of metallurgy and metallography in Harvard University. $7\frac{1}{2} \times 11$ in.; pages, xvi + 413; illustrations and diagrams, 356. Published by Sauveur & Boylston, Cambridge, Mass. Price, \$6.

As the title implies, Professor Sauveur's book deals almost entirely with the metallography of iron and steel and is therefore the first complete book on this subject. It consists of an introduction, a description of apparatus recommended by the author, and 24 chapters. These are followed by two appendices, the first on methods and apparatus used by other workers, and the second on the nomenclature of the microscopic substances and structures of steel and cast iron, as recommended by the special committee of the International Association for Testing Materials, Professor Sauveur being the secretary of the committee. The chapters are called "lessons," and have evidently been written so that they can be used as such. At the close of each experiment are suggested to substantiate the test, and questions are asked covering the points brought up. For this reason the book would be excellent for use as a text book.

The first chapter is on Pure Metals, followed by two on Pure Iron, and Wrought Iron, where the author's methods of preparing specimens are carefully explained. Next comes 15 chapters on Steel. Low Carbon Steel is first dealt with, then Medium High and High Carbon Steel, followed by the Impurities in Steel. The next three chapters are on the very important subject of the Thermal Critical Points of Iron and Steel, their occurrence, cause and effects. After two more on Cast Steel and Mechanical Treatment come four very good ones on Heat Treatment under the headings of Annealing, Hardening, Tempering, and Theories of Hardening. The next subject is Cementation and Case Hardening. The last two of the 15 chapters mentioned are on the Special Steels, dealing with general considerations, constitution, properties, treatment, and the uses of the most important types. Then come three chapters on Cast Iron, headed Cast Iron, Impurities in Cast Iron, and Malleable Cast Iron. They are followed by one on Metallic Alloys, which is introductory to one on the Equilibrium Diagram of the Iron-Carbon Alloys. The chapter on the Phase Rule is short and is followed by the appendices which have been mentioned.

The book as a whole is excellent and can be warmly recommended to every one interested in iron and steel. It is a notable addition to the literature of a science in which American workers have taken a prominent place. It is well printed and the numerous illustrations and diagrams are well chosen and splendidly reproduced. Many of the more theoretical subjects treated are controversial, but the author presents his own views without prejudice, and so far as possible uses clear and simple language. In the present writer's opinion a bibliography of important original papers, given at the end of each chapter, would add greatly to the value of the book; and more careful editing is necessary in a few places, as in the case of the statement that "quartz, felspar, and mica are phases of quartz."

G. B. W.

Machine Design, Hoists, Derricks, Cranes. By H. D. Hess. Bound in cloth. Size, 6×9 in.; pages, 368; 318 illustrations and 11 plates. Published by the J. B. Lippincott Company, Philadelphia, Pa. Price, \$5 net.

The book is intended as an aid to the work of machine design in technical schools and colleges as well as proving useful in drawing rooms where the general field of machine design is covered. In this connection it is the author's belief that no class of problems affords as good a general training and practice as may be had in the design of cranes since the larger portion of crane details are simplest machine elements which are common to a wide field of machine design. The stresses both in the cranes and machinery are readily determined by the elementary principles of mechanics and the design is thus easily carried out on a theoretical rather than an empirical basis. Engineering literature has been drawn upon to furnish a considerable portion of the material and in many cases the illustrations show what is considered standard American practice at the present time. In the selection of the problems care has been taken to fit them for the special field for which the book is intended rather than

to give such as appeal only to the specialist in crane design.

The book is divided into twelve parts and following the introductory section which deals with the properties of metal, working fibre stresses, properties of various parts of cranes and the dimensions and properties of the various sections entering into crane construction, the subjects of cranes, girders and brakes and clutches are taken up in the next two parts. Part IV. is devoted to the design of winches and hoists and the designs of a 5000-lb. winch and a winch for a 10-ton crane are discussed, together with that of a 2-ton electric assembling hoist. The remainder of the book, with the exception of 10 pages is given over to cranes of various types, including pillar, jib, under-braced jib, inverted post, wall, overhead electric traveling and locomotive cranes. One chapter deals with hoisting engines and discusses the design of electrically driven and steam hoists. Included in this chapter also are data on the size of engines and boilers for steam-driven hoists and the proportions of engine details.

Cast Iron in the Light of Recent Research. By H. W. Hatfield. Pages xiii + 244, with frontispiece and 164 illustrations, including many photomicrographs. Published by Charles Griffin & Co., Ltd., London, and the J. B. Lippincott Company, Philadelphia. Price \$3.50.

The author has followed closely all papers and publications by various metallurgists and experimenters in England, the United States and other countries, and has condensed all conclusions of value among these. He has also included various results of his own work, all of which is brought down to the present time. The first six chapters deal with the iron-carbon diagram and the influence of the various elements thereon, all of interest because up to date, especially the one regarding vanadium. Then follow chapters on the "Influence of Casting Temperature" and "The Shrinkage and Contraction of Cast Iron." There is a chapter on the "Growth of Cast Irons During Repeated Heatings" which offers a satisfactory scientific explanation of this phenomenon. Of nearly equal interest is the chapter on the "Effect of Superheated Steam upon Cast Iron Fittings, etc." Other chapters are on "Malleable Cast Iron," "Heat Treatment of Cast Iron," "Decarburization of Cast Iron Without Further Fusion," "Mechanical Properties of Cast and Malleable Cast Iron," and "Furnaces and Slags." Each chapter is illustrated by fine photomicrographs. In the appendix is a valuable nomenclature table giving clear and concise definitions of metallurgical terms, including the German and French equivalents.

E. F. C.

The Industrial Development of Nations. By George B. Curtiss, counselor at law. Three volumes: Vol. I, 640 pages; Vol. II, 550 pages; Vol. III, 694 pages. Cloth. Illustrated. For sale by the author, 508 Security Mutual Building, Binghamton, N. Y. Price, \$15.

In 1896 Mr. Curtiss published a book entitled "Protection and Prosperity," giving an account of tariff legislation in European countries and in the United States, which is held by competent authorities as the most complete history of the effect on national prosperity of various tariff systems that had been in force up to that time. The three volumes now brought out are an expansion of the 1896 publication. Vol. I is wholly devoted to European countries, and brings its presentation of facts down to the present year. Vol. II takes up the industrial development of the American colonies, and carries the tariff history of this country to 1860. Vol. III gives in chronological succession the tariff history of the United States from 1860 to 1912.

It will be seen that this work is most comprehensive in its scope. Although the author is a protectionist, and has massed his facts in support of the policy of protection, he has not merely presented a plea or an argument in favor of the cause he advocates. He has studied deeply the course of tariff legislation in this and other countries and has given in these three volumes a history of the progress of the leading countries of the world as affected by their laws relating to imports. The dry details of enactments and their effects are enlivened with quotations from the speeches of eminent statesmen and economists of various countries discussing tariff measures and their effects. Thus much of human interest is interwoven in this great contribution to the study of political economy. Protectionists and free traders will find these volumes a most valuable storehouse of information.

THE IRON AGE

Published Every Thursday by the

David Williams Company
239 West 39th Street New York

W. H. Taylor - President and Treasurer
I. A. Mekeel - First Vice-President
Fritz J. Frank - Secretary
M. C. Robbins - General Manager

Editors

Geo. W. Cope A. I. Findley W. W. Macon

Charles S. Baur - Advertising Manager

Branch Offices

Chicago: Otis Building Philadelphia: Real Estate Trust Bldg.
Pittsburgh: Park Building Cleveland: American Trust Building
Boston: Compton Building Cincinnati: Mercantile Library Bldg.

Entered at the New York Post Office as Second-class Mail Matter

Subscription price: United States and Mexico, \$5.00 per year; to Canada, \$7.50 per year; to other foreign countries, \$10.00 per year.

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The Steel Works Labor Problem

Some of the very practical difficulties which must be overcome before hours of labor in the steel industry become what manufacturers as well as their critics would have them were referred to on this page last week. The New York Times comments on the cases then cited, of men compelled by the Steel Corporation regulations to take one day off each week, who spent the seventh day working on some other job: "With the cost of living what it is now, no workingman can be expected to be grateful for a change, no matter how beneficial in itself, that cuts down his earnings." Quite true. But the steel companies have been pilloried as standing in the way of the workman's development as a man and of the development of right life in his home. They admit the justice of the criticism and set about to liberate the workman from the seven-day slavery of which the muckrakers tell. And then the liberated toiler, not knowing that he was the broken down and exhausted victim of corporation greed, sets about to inflict on himself and his family that which had made his employer anathema of the jungle writers.

The long hours of the steel industry are not a modern invention. They existed in the last generation and in the one before that, and it would even appear that many workers have chosen the steel industry because of the opportunity to earn seven days' rather than the six days' pay possible in most employments. But sentiment within and without the industry favors reducing the long hours, and in two years more has been done in that direction than in 50 years before—two years in which wages at iron and steel works have averaged higher than have ever been known. Investors in the various steel shares know that their returns in that time have been by no means the best on record and that where these have not been reduced their payment has been at the expense of the underlying property. Steel manufacturers are not such uncommon men that they have any device for circumventing the plain arithmetic of the shortened week or the shortened day. There is no magic in steel manufacture by which the workman's day can be shortened from 12 hours to 8 hours and his day's pay remain the same.

At the one large plant at which the 8-hour blast furnace turn (seven days a week, however) has been substituted for the 12-hour turn, the plan called for such an adjustment that the company's total outlay for furnace labor would not be more than before, while the working force was increased by considerably less than 50 per cent. The weekly wage of a workman was reduced by 14 per cent. or by just the amount that would have come off had a change been made from a seven-day week to a six-day week, with a day of 12 hours. It is plain that under such an adjustment a man does more work per hour than he did before. In the case of the steel foundry at Granite City, Ill., as cited last week, the company advanced the hourly rate 17 to 22 per cent. when the turn was cut from 12 to 8 hours. But at that, the week's wage was reduced considerably. If, as experience thus far demonstrates, there is an economy to this company in the 8-hour shift on the present basis, the question will come up of a further readjustment of the hourly rate, so that increased efficiency of the workers will bring them correspondingly closer to their former weekly wage.

The question is one which must be met by give and take. For political reasons, leaders in the industry

may be a good deal interfered with in trying to work it out. But one fact cannot be cried down, and that is the effort many companies are making to meet the demand for improvement in iron and steel works hours—indeed, to make all conditions in the industry better than they were in the days of union control with its benefits to a limited number of skilled men at the expense of the rank and file.

The Structural Steel Work Dynamiters

When the sensational disclosures came in the arrest of the McNamara brothers the enormity of the offenses committed by representatives of the International Association of Bridge and Structural Iron Workers was so appalling that an opposite effect was produced from that expected by those who sympathize with employers. Instead of a countrywide outburst of resentment at the manner in which certain labor unions were being conducted, as shown by these disclosures, a disposition was observed to jump to the conclusion that the workmen in the structural steel trade must have been seriously oppressed or there could not have been such a strong feeling of resentment as to lead to these criminal acts. Instead of a great wave of righteous indignation a curiously sympathetic feeling sprung up toward the workmen in this and other branches of trade. It was probably due to the prevalence of this feeling that labor measures which had long failed of adoption were crowded through Congress at its last session and became law. It is probable that if the criminal acts had been fewer and the destruction of property and of lives had been less there would have been a greater feeling of hostility to labor leaders who would carry out such a system of terrorism.

Another chapter in this great tragedy is now being unfolded. At Indianapolis a large number of officers of the association are being tried in a Federal court on charges of conspiracy and of the illegal shipment of dynamite. This week one of the indicted officers, the business agent of the Cincinnati local union, changed his plea of not guilty to guilty, as the evidence against him was apparently too direct for him to hope for acquittal. It is likely, according to report, that others will follow his course and throw themselves on the mercy of the court. It remains to be seen whether public opinion, proverbially fickle, will change its attitude on this question and demand that these criminals be punished to the full extent of the law even if they do plead guilty. The developments in this case simply show that the union implicated was determined to maintain its power in the structural steel trade and that the officers were prepared to go to any length in the endeavor to accomplish their purposes.

Simplifying Erecting Room Labor

In some of the best managed of the large automobile works the erecting departments are absolutely devoid of machinery and tools for use in fitting, the reason being that every piece is presumed to go to the department literally ready for use. The shops must work to such exact limits that no additional labor need be done. A prominent manufacturer of machine tools had this system called to his attention, and investigated his own works to ascertain if it could be applied. His researches demonstrated that a great deal of unnecessary work was done in the fitting of machinery in the erecting room. He determined that every depart-

ment should complete its tasks, and limits of precision were created, with careful inspection to insure that nothing went to the erecting room unless it was ready to take its place in the machine. It costs little if any more to do machine work correctly in the beginning. A marked saving results in the assembling. The shop should thoroughly understand that it can place no dependence for assistance upon the mechanics who bring together the various units into a completed machine.

In establishing fire hydrants in manufacturing plants care should be taken that the hose connections are of the same standard as the city or town fire service, else the public fire department will be helpless to aid in case of need. Hose connections have never been standardized, and the types accepted by different communities vary greatly, even as between adjoining cities and towns, which depend upon one another for assistance in case of a conflagration. An investigation of these conditions will show not a few owners of industrial works that their chief source of fire protection is useless except with their own lines of hose. The suggestion is made that, where such a condition is found to exist, intermediate connections be procured, one end for the hydrant, the other for the public service hose.

It appears that German steel manufacturers, exemplars of prudence and efficiency, are capable of making unfortunate investments. Our Berlin correspondent states that a steel company in Silesia has decided to abandon an iron ore property in Norway which was acquired several years ago, in conjunction with another Silesian company, at an expense of about 8,000,000 marks (\$2,000,000). The company's experts have advised it that the property cannot be worked at a profit and it has been decided to write off the purchase price as lost. Even in this country a venture which involved the sinking of so large a sum would be regarded as quite a serious matter.

Contract for Corrigan-McKinney Steel Plant

Corrigan, McKinney & Co., Cleveland, Ohio, have awarded the contract for the structural steel for their new steel plant in Cleveland to the American Bridge Company. Between 16,000 and 17,000 tons will be required. The contract includes the open-hearth and finishing mill structures. It has been practically decided that the plant will include a steel rail mill and probably a merchant mill. It is planned to start the erection of the plant about June, 1913, and have it ready for operation late in the following year.

That metals will vaporize like ice, especially in a current of indifferent gas, is not a generally known theory. Prof. Joseph W. Richards, Lehigh University, in a paper entitled "The Vaporization of Metals," and read at a meeting of the American Institute of Metals, says that many metals ordinarily considered as nonvolatile will evaporate when melted and even when in a solid state, just as zinc does. Silver, for instance, can evaporate from solid ingots which are being heated by direct contact with the flame. He suggests that the melting of all metals be done in crucibles with covers, for a great saving of the metal will result.

The Detroit Shipbuilding Company has taken an order from the George Hall Coal Company for two steel freight boats of Welland Canal size for the coal trade on Lake Ontario and the St. Lawrence River. The boats will be completed for delivery early next season.

Minimizing the Smoke Nuisance

Discussion by Mechanical Engineers
in New York on Tuesday Evening

At the New York monthly meeting of the American Society of Mechanical Engineers held on October 8 at the Engineering Societies Building, 29 West Thirty-ninth street, New York City, the problem of smoke abatement was considered. The discussion was opened by George H. Perkins, who attended the International Smoke Abatement Congress in London last Spring. His paper was in the shape of an informal report made by him to the trustees of the Lowell Textile School, Lowell, Mass., who delegated him to attend this gathering. Mr. Perkins expressed the opinion that the solution of the smoke problem necessarily rests with the mechanical engineer and that the development of a strong and intelligent public sentiment on the economic and sanitary necessity for smoke abatement must come through a widespread campaign of education in which the society must take a part. There are a number of societies for this specific purpose in existence in England doing effective work.

Following the presentation of this paper there was a general discussion. Lieut. James Reed, Jr., U. S. N., assistant director of public works, Philadelphia, explained that both bituminous and anthracite coal are used, the localities in which the former can be burned being restricted by municipal ordinances. The first smoke prevention enactment was passed in 1904 and provided for the appointment of two smoke inspectors. At the present time the chief trouble is with the locomotives which are permitted to emit smoke for 10 min. while firing, and half that period when shifting, although the railroads themselves are helping by the appointment of engineers and firemen to act as inspectors and instructors. The influence of the ordinance has been felt in the installation of stokers. John M. Lukens, chief of the bureau of boiler inspection, Philadelphia, looked upon the electrification of the railroads as a remedy for the trouble now experienced.

Prof. L. P. Breckenridge compared the conditions in New York City with Chicago, St. Louis and Cleveland and asserted that the problem here was a small one. In his opinion it would be necessary to burn soft coal for domestic as well as manufacturing purposes before long and the public must be educated on the subject. Soft coal could, he asserted, be burned in power-plant boilers without making objectionable smoke and he placed reliance upon proper furnace design to prevent smoke. In conclusion he suggested the blending of coal as a possible solution of the problem.

A. A. Cary gave the results of a number of tests made by him with various fuels without producing smoke. Smoke was caused, in his opinion, by improper chilling action in the boiler furnaces, and he agreed with the previous speaker that soft coal could be burned without making smoke. His views and experience on furnace design, the sampling of gases of combustion and allied subjects will appear in a series of three articles in *The Iron Age*, beginning with that on page 831 of this issue.

George L. Prentiss suggested that licensing firemen like engineers would secure good results.

Prof. William Kent cited a case of a plant where no smoke was produced when the boiler was not forced but smoked badly when the rate of combustion was increased due to the improper supply of air. At the present time, however, the plant is operating without making smoke with the boilers overloaded 100 per cent.

The last speaker, Prof. D. S. Jacobus, said that the problem of minimizing smoke is an easy one with proper design, although it is hard to make a plant absolutely smokeless on account of the variations in load which have to be provided for. Forced draft is, he added, a help in this connection.

The American Institute of Chemical Engineers will hold its fifth annual meeting in Detroit, Mich., December 4 to 6, 1912. A number of the technical plants in and around Detroit will be visited and a programme of papers and addresses presented. L. H. Baekeland, Yonkers, N. Y., is president, and J. C. Olsen, Polytechnic Institute, Brooklyn, N. Y., is secretary.

Virginia Iron, Coal & Coke Company Annual Report for Year Ended June 30, 1912

The Virginia Iron, Coal & Coke Company has issued its report for the year ended June 30, 1912. The income account compares as follows:

	1912	1911	1910
Gross earnings.....	\$2,893,214	\$3,370,923	\$3,695,225
Expenses	2,614,697	3,034,688	3,177,345
Net earnings.....	\$278,517	\$336,235	\$517,879
Other income.....	33,642	35,506	41,003
Total income.....	\$312,159	\$371,741	\$558,882
Charges, taxes, depreciation, development, etc.....	685,199	634,527	688,809
Deficit	\$373,040	\$262,786	\$129,927

Operating accounts were charged during the year with the following amounts for depreciation:

Fund for depreciation of coal lands.....	\$83,778
Fund for depreciation of ore lands.....	4,808
Fund for depreciation of improvements to owned properties.....	147,052
Fund for depreciation of improvements to leased properties.....	65,311
Fund for furnace repairs.....	19,857
Total	\$320,807

The following amounts were expended during the year for improvements to owned and leased properties:

Improvements to owned properties.....	\$37,852
Improvements to leased properties.....	55,922
Repairs to furnaces (charged to fund account).....	55,920
Total	\$149,696

The general balance sheet as of June 30, 1912, compares as follows:

Assets.			
	1912	1911	1910
Real estate.....	\$12,632,985	\$14,056,448	\$13,795,732
Equipment	352,114	310,107	278,848
Securities owned.....	230,663	107,363	197,363
Ledger balance.....	404,054	359,888	625,051
Open accounts.....	64,146	44,809	45,588
Bills received.....	43,862	70,470	106,919
Advance to cashier, etc.....	4,969	5,275	5,325
Cash on hand.....	167,137	104,428	89,772
Material on hand.....	3,026,516	3,222,810	2,747,707
P. & L. deficit.....	1,039,502	653,644	377,500
Total	\$17,965,948	\$19,025,241	\$18,269,807
Liabilities.			
Capital stock.....	\$10,000,000	\$10,000,000	\$10,000,000
Bonds	5,275,000	5,305,000	5,332,000
Unpaid vouchers and payrolls.....	288,665	267,797	217,978
Bills and accounts payable.....	2,296,178	2,127,262	1,706,603
Interest and taxes.....	86,104	86,604	86,958
Depreciation, replacement funds, etc.....	20,000	1,238,577	916,266
Total	\$17,965,948	\$19,025,241	\$18,269,807

The Machinery Club of the city of New York, through a recently appointed special membership committee, is extending the privileges of the club to all visiting members of the National Machine Tool Builders' Association during the week in which its convention occurs. The machine tool men will be in session October 16 to 18, inclusive. Special cards of introduction may be obtained by association members who address the special membership committee at the club, 50 Church street. The privileges extended give the ladies who accompany the visitors the use of the ladies' dining room and corridors from which fine panoramic views of downtown New York, the North River and New Jersey may be had.

Methods of cleaning producer gas prepared from bituminous coal are discussed in a paper by H. F. Smith, general manager Smith Gas Producer Company, Lexington, Ohio, presented before a meeting of the Western Society of Engineers and published in the journal of the society for September. Raw producer gas made from bituminous coal contains tar in the form of minute particles, approximately 4 grains of tar per cubic foot. To obtain good quality some process of removing the volatile hydrocarbons is necessary and this is discussed in connection with changes in the design of producers.

Lockwood, Greene & Co., architects and engineers for industrial plants, have removed their Boston offices from 93 Federal street to 60 Federal street, where they occupy the seventh, eighth, and ninth floors of the new First National Bank Building.

Lake Iron Ore Shipments in September

The movement of Lake Superior iron ore down the lakes in September amounted to 7,287,230 gross tons, as compared with 7,760,248 tons in August and 7,600,233 tons in July. The total to October 1 this year was 36,338,382 tons against 24,837,137 tons to October 1, 1911, an increase of 11,501,245 tons. The table below gives the September and season shipments by ports and the corresponding figures for 1911, all in gross tons:

	September, 1912	September, 1911	To October 1, 1912	To October 1, 1911
Escanaba	770,974	668,595	4,010,985	3,086,847
Marquette	566,178	367,964	2,567,578	1,568,711
Ashland	757,764	368,945	3,623,161	1,878,786
Superior	2,031,086	1,563,836	11,097,276	7,946,109
Duluth	1,652,735	1,131,247	7,729,187	5,501,364
Two Harbors	1,508,493	1,130,482	7,310,195	4,855,320
Total	7,287,230	5,231,069	36,338,382	24,837,137
1912 increase...		2,056,161		11,501,245

The heavy shipments from Superior show the great activity at the Hill properties which are operated by the United States Steel Corporation. It is evident that unless conditions on the lakes are unexpectedly unfavorable in November, the total brought down this year will be well about the 45,000,000 ton mark.

Hadfield's Projectiles Forged, Not Cast

The New York Times of September 27 printed a cablegram from Berlin dated September 26 which read as follows:

"A prominent American steel magnate, now in Germany, who was one of the unsuccessful bidders against the Hadfield Steel Foundry Company of Sheffield for the United States Navy Department's order for projectiles, gives the following explanation of the difference between the British and American tenders: 'The real reason for the difference in price is one of quality. Hadfield shells, which are first rate for their kind, are all made of open hearth cast steel and are not forged at all, while American shells are all made of the highest quality crucible steel and then forged.'"

On the appearance of this statement *The Iron Age* addressed a letter to Sir Robert A. Hadfield of the Hadfield Steel Foundry Company, asking whether the assertion made in it was true. A cablegram received from him on Monday of this week says: "Emphatically contradict the Berlin statement. As we guarantee, our projectiles offered your Navy Department are entirely forged from highest grade Hadfield steel, identical with thousands of similar large calibres recently proved and accepted by our own and foreign navies."

Cleveland City Forge & Iron Company Changes

The Cleveland City Forge & Iron Company, Cleveland, Ohio, announces the following changes in its organization in addition to those previously published: James F. Mollen, formerly purchasing agent Variety Iron & Steel Works Company, and later purchasing agent Hill Clutch Company, Cleveland, to become purchasing agent October 16; P. A. Stratton, formerly of the Westinghouse Electric & Mfg. Company, and later with the Hill Clutch Company, auditor; James Parker, formerly with the Mau-Sherwood Supply Company, Cleveland, added to the sales department. The company has changed the name of the turnbuckle department to light forging department. J. A. Costello was recently promoted from assistant manager to manager of this department. The company, under its new general manager, H. D. Campbell, is planning to build up a strong organization and to re-arrange the manufacturing end of its business to a higher point of efficiency. With this end in view, Anton Burchard, engineer, Cleveland, has been engaged to prepare plans for general re-arrangement of the plant.

The report of the employment bureau of the Boston branch of the National Metal Trades Association shows that in the three months ended with September there were 1070 applications and 509 new registrations. The number of men sent out was 455 and the number hired 225.

The William B. Pollock Company, Youngstown, Ohio, has received a contract for the iron work for three stoves and necessary piping for No. 1 blast furnace of the Republic Iron & Steel Company at Haselton, Ohio.

The American Supply of Foreign Labor

The scarcity of common laborers has grown to be a serious condition in the iron and steel trades. It is felt almost universally. Steel manufacturers, blast furnace operators, bar iron producers, coke makers, foundrymen and even old material dealers having scrap sorting yards state that they are considerably hampered in their operations on this account. Notwithstanding the use of labor-saving appliances wherever possible, it is still necessary to rely upon manual labor for a great many operations. As the situation appears to be growing worse, due to the efforts of all interests in the iron and steel trades to increase output, efforts are being made to correct the condition of affairs and to secure a more adequate supply of this class of workingmen.

For a very considerable period of years the manufacturers of this country have been obliged to rely upon immigrants for additions to this class of help. For a long time the stream of immigration into this country was so large that no difficulty was experienced in securing as many foreign laborers as could conveniently be handled in connection with previous working organizations. This source of supply has, however, considerably diminished within the past couple of years, and it has become a matter of interest among manufacturers to know the cause therefor. Among others who have been prompted to look into this question is P. L. Frailey, manager of publicity of the Brier Hill Steel Company, Youngstown, Ohio. Mr. Frailey has called the attention of the Bureau of Labor, Washington, D. C., to this matter, believing that the problem of securing more labor is of sufficient importance to merit a special investigation by the government.

Mr. Frailey has gone farther than this, in communicating with our consular representatives at various localities in Europe, inquiring whether some special cause can be found for the restriction in the flow of common labor to this country. Some of the replies received give little hope of a change in the immediate future. One, from a locality embracing the area of the largest source of the Italian movement to the United States, says: "A primary contributory cause for the decrease in Italian emigration may be found in the steadily advancing development of local industrial and economic conditions. This fact, offering an augmenting home demand for labor with increasing daily wage, naturally lessens the necessity of search for employment in foreign markets. The cost of ordinary labor in the cities has more than doubled in the past ten years and in some instances now is as high as 5 and 6 lire (\$0.965 to \$1.158) per day. The demand for labor in the Argentine, which offers better climatic conditions, also militates against emigration to North America. The physical and general ability standard of the persons seeking emigration is steadily growing lower. The composition of the emigration class is gradually resolving itself to such persons as are less able to compete successfully in the local labor market. Emigration this year has been especially influenced by the Italian-Turkish war which necessitated the calling to arms of the reserves of the birth year 1888-1889. There is no doubt that at the close of the war Italy will seek to foster and encourage emigration to her new colonies. This, of course, will be at the expense of such a movement to the Western hemisphere. As far as can be learned, the Italian Government has taken no discernible steps to discourage emigration."

The consulate at Budapest, Hungary, says: "In 1909 a law was enacted by the Hungarian Parliament providing that emigration from Hungary can take place only under certain conditions, and the effect has been to diminish the number of emigrants which for several years prior to the enactment of this law left Hungary every year for the United States. The reason for this action was purely economical, a great dearth of laborers having been experienced to the detriment of the development of Hungarian agriculture and industry. It is possible that the loss of a certain number of young men fit for military service may have been considered in this connection."

The Ohio Falls Iron Company, New Albany, Ind., manufacturer of bar iron, has resumed operation with full force, double turn, in all departments. Good orders have been booked.

A Gain in Merchant Pig Iron

September Daily Rate Up 1450 Tons

Total of Furnaces Active October 1 Is Ten More than on September 1

While steel works furnaces fell off slightly in daily output last month, merchant furnaces reached the highest daily rate since June, 1910, showing a gain of nearly 1450 tons a day over their output in August. The falling off of steel works furnaces was about 350 tons a day from their August performance. The total output of coke and anthracite iron last month was 2,463,839 gross tons, or 82,128 tons a day, against 2,512,431 tons in the 31 days of August, or 81,046 tons a day. There was a gain of 10 in furnaces in blast, the number producing iron on October 1 being 266. The merchant furnaces gained 8 and the steel works furnaces 2. On October 1 production of coke and anthracite iron was at the rate of 83,426 tons a day, or 30,450,000 tons a year. Including charcoal iron, production is now at the rate of nearly 30,800,000 tons a year.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from September, 1911, is as follows:

Daily Rate of Pig Iron Production by Months—Gross Tons.		
	Steel works.	Merchant.
September, 1911	49,696	16,207
October	50,351	17,460
November	48,430	18,218
December	46,885	19,027
January, 1912	47,844	18,540
February	53,482	18,960
March	58,961	18,630
April	61,024	18,157
May	62,018	19,033
June	60,799	20,559
July	58,168	19,570
August	59,464	21,582
September	59,102	23,026
		Total.
September, 1911		65,903
October		67,811
November		66,648
December		65,912
January, 1912		66,384
February		72,442
March		77,591
April		79,181
May		81,051
June		81,358
July		77,738
August		81,046
September		82,128

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in September and the four months preceding:

Monthly Pig Iron Production—Gross Tons.

	May. (31 days)	June. (30 days)	July. (31 days)	Aug. (31 days)	Sept. (30 days)
New York	177,846	176,216	167,935	167,337	161,223
New Jersey	2,773	2,773	5,309	5,935	5,693
Lehigh Valley	75,444	72,074	72,248	80,987	79,726
Schuylkill Valley	65,252	67,096	69,776	71,937	71,085
Lower Susquehanna and Lebanon Val.	47,336	50,034	58,032	59,852	65,604
Pittsburgh district	634,160	591,178	583,745	584,601	546,829
Shenango Valley	119,018	118,801	114,877	116,610	121,951
Western Penn.	141,385	138,354	135,876	145,321	142,669
Maryland, Virginia and Kentucky	38,005	42,569	40,313	43,962	42,896
Wheeling district	117,993	107,077	101,674	111,561	108,932
Mahoning Valley	247,401	229,159	234,248	252,342	243,906
Central and North Ohio	193,012	191,603	178,777	196,901	218,867
Hocking Valley, Hanging Rock and S. W. Ohio	40,267	34,817	31,196	35,410	30,279
Chicago district	377,292	387,567	374,153	383,540	365,115
Mich., Minn., Mo., Wis., Col., Wash.	67,825	63,649	68,910	73,278	77,902
Alabama	150,915	141,422	147,409	156,115	153,374
Tenn., Georgia and Texas	19,431	26,356	26,411	26,742	27,788
Total	2,512,582	2,440,745	2,410,889	2,512,431	2,463,839

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of product month by month. Only steel-making iron is included in these figures, together with ferromanganese, spiegeleisen and ferrosilicon. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons.

	Pig. Total production			Spiegeleisen and ferromanganese.		
	1910.	1911.	1912.	1910.	1911.	1912.
January	1,773,201	1,128,448	1,483,153	19,538	8,360	22,622
February	1,620,539	1,185,782	1,550,995	21,396	12,821	15,950
March	1,739,212	1,518,063	1,827,792	25,591	11,784	11,538
April	1,669,898	1,434,142	1,830,717	22,304	10,657	11,104
May	1,619,283	1,310,378	1,922,557	26,529	13,641	20,518
June	1,549,112	1,281,241	1,823,958	27,680	22,611	26,685
July	1,462,689	1,316,646	1,803,205	22,924	17,067	26,522
August	1,442,572	1,460,610	1,843,404	25,756	14,579	24,225
September	1,410,221	1,490,898	1,773,073	15,151	17,757	22,484
October	1,419,624	1,560,884	.....	8,500	19,697	.....
November	1,242,804	1,452,907	.....	9,032	19,678	.....
December	1,113,174	1,453,446	.....	12,178	20,698	.....

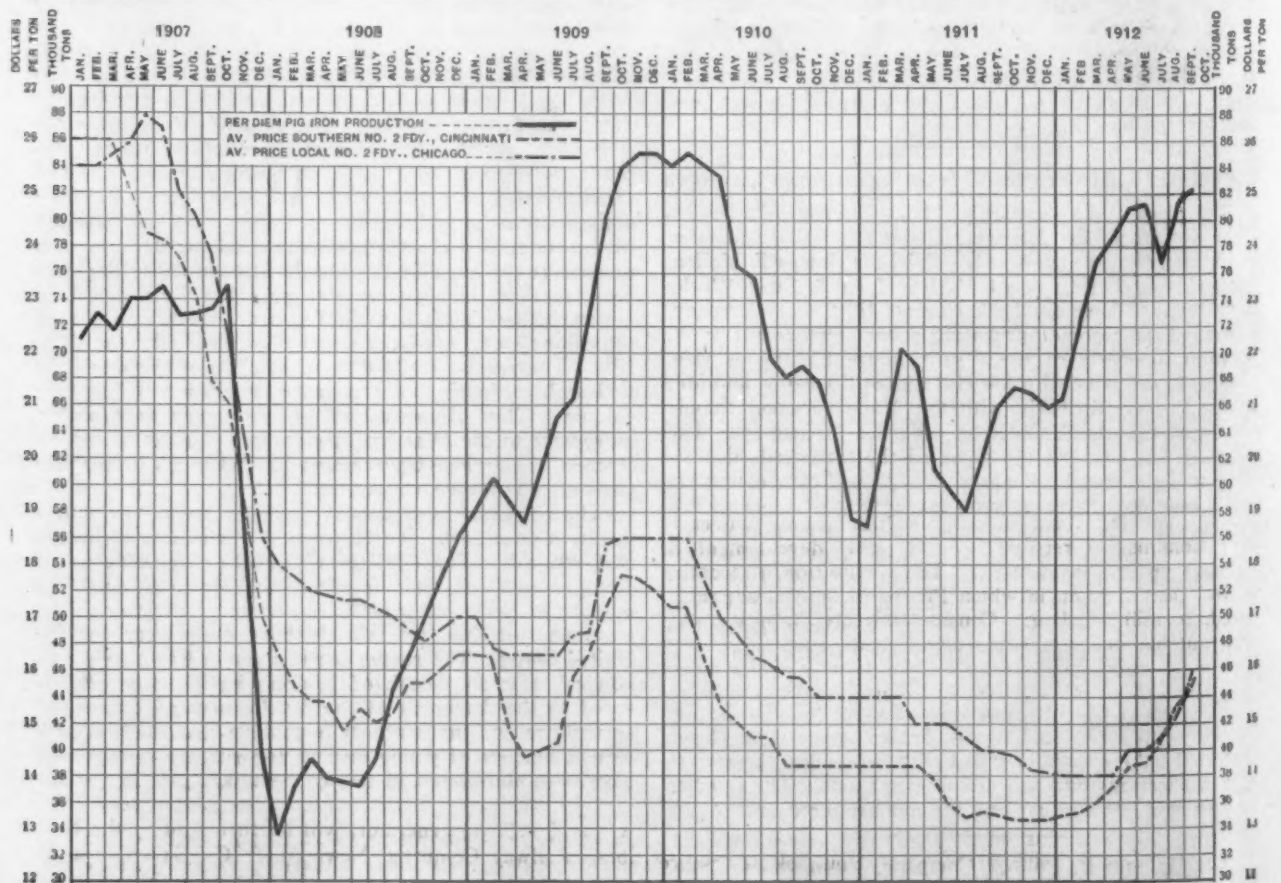


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from January 1, 1907, to October 1, 1912; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

Capacity in Blast October 1 and September 1

The table below shows the daily capacity of furnaces in blast October 1 and September 1:

Coke and Anthracite Furnaces in Blast.					
Location of Furnaces.	Total number of stacks.	Oct. 1 Number in blast.	Oct. 1 Capacity per day.	Sept. 1 Number in blast.	Sept. 1 Capacity per day.
New York:					
Buffalo	17	15	5,165	15	5,015
Other New York	7	2	409	2	382
New Jersey	7	1	190	1	190
Pennsylvania:					
Lehigh Valley	22	11	2,375	12	2,425
Spiegel	2	2	165	1	90
Schuylkill Valley	16	9	2,545	8	2,320
Lower Susquehanna	7	4	910	5	1,120
Lebanon Valley	10	6	1,015	7	1,125
Pittsburgh District	49	43	18,275	42	18,233
Spiegel	4	4	453	4	520
Shenango Valley	20	14	4,350	11	3,762
Western Pennsylvania	27	18	4,810	18	4,860
Maryland	4	2	560	2	626
Wheeling District	14	10	3,631	10	3,620
Ohio:					
Mahoning Valley	24	21	8,210	21	8,050
Central and Northern	24	19	7,295	18	6,890
Hocking Val., Hanging Rock & S. W. Ohio	15	7	1,009	7	1,142
Illinois and Indiana	32	28	12,045	28	12,255
Spiegel	2	2	140	2	240
Mich., Wis. and Minn.	10	7	1,470	7	1,385
Colorado, Mo. & Wash.	8	3	1,126	3	1,040
The South:					
Virginia	23	6	813	5	735
Kentucky	5	1	130	1	130
Alabama	46	21	5,215	19	5,040
Tennessee	20	10	1,120	7	863
Total	415	266	83,426	256	82,058

Furnaces blown in in September or on October 1 include one Lackawanna at Buffalo, one Palmerton in the Lehigh Valley, one Brooke in the Schuylkill Valley, one Duquesne in Allegheny County, Alice, Hall and one South Sharon in the Shenango Valley, one River in Northern Ohio, Radford Crane in Virginia, Mattie in the Mahoning Valley, two Bessemer in Alabama, Chattanooga, Napier and No. 2 Rockwood in Tennessee.

Among furnaces blown out were one Susquehanna at

Buffalo, one Crane in the Lehigh Valley, one Steelton in the Susquehanna Valley, Robeson in the Lebanon Valley, and one Hubbard in the Mahoning Valley.

Chart of Pig Iron Production and Prices

The fluctuations in pig iron production from January, 1907, to the present time are shown in the accompanying chart. The figures represented by the heavy line are those of daily average production by months, of coke and anthracite iron. The two other curves on the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of *The Iron Age*. The figures for daily average production are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.

	1907.	1908.	1909.	1910.	1911.	1912.
January	71,149	33,918	57,975	84,148	56,752	66,384
February	73,038	37,163	60,976	85,616	64,090	72,442
March	71,821	39,619	59,232	84,459	70,036	77,591
April	73,885	38,289	57,962	82,792	68,836	79,181
May	74,048	37,603	60,753	77,102	61,079	81,051
June	74,486	36,444	64,656	75,516	59,585	81,358
July	72,763	39,287	67,793	69,305	57,841	77,738
August	72,594	42,851	72,546	67,963	62,150	81,046
September	72,783	47,300	79,507	68,476	65,903	82,128
October	75,386	50,554	83,856	67,520	67,811	.....
November	60,937	51,595	84,917	63,659	66,648	.....
December	39,815	56,158	85,022	57,349	63,912	.....

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since January 1, 1907—Gross Tons.

	1907.	1908.	1909.	1910.	1911.	1912.
Jan.	2,205,607	1,045,250	1,797,560	2,608,605	1,759,326	2,037,911
Feb.	2,045,068	1,077,740	1,707,340	2,397,254	1,794,509	2,100,815
Mar.	2,226,457	1,228,204	1,832,194	2,617,949	2,171,111	2,405,318
Apr.	2,216,558	1,149,602	1,738,877	2,483,763	2,064,086	2,375,436
May	2,295,505	1,165,688	1,883,330	2,390,180	1,893,456	2,512,582
June	2,234,575	1,092,131	1,930,866	2,265,478	1,787,566	2,440,745
July	2,255,660	1,218,129	2,103,431	2,148,442	1,793,068	2,410,889
Aug.	2,250,410	1,359,831	2,248,930	2,106,847	1,926,637	2,512,431
Sept.	2,183,487	1,418,998	2,385,206	2,056,275	1,977,102	2,463,839
Oct.	2,336,972	1,567,198	2,599,541	2,093,121	2,102,147	.....
Nov.	1,828,125	1,577,854	2,547,508	1,909,780	1,999,433	.....
Dec.	1,234,279	1,740,912	2,635,680	1,777,817	2,043,270	.....

Baltimore Business and Industrial Notes

The Jones Hollow Ware Company has started operations in its recently acquired plant, formerly that of the Montford Machine Castings Company, making its regular line of hollow ware.

The International Cotton Mills Company has awarded the general contract for a five-story cotton mill, of concrete and steel construction, to the Abershaw Construction Company, Boston, Mass., from plans by Lockwood, Greeve & Co., architects, Boston.

The Dix Mfg. Company, manufacturer of noiseless door hangers, reports a steady volume of business in the past few months. Orders from the Pacific coast and Middle West have been exceptionally good, but New England continues to drag. The plant is still below the full capacity mark.

The Gandy Belting Company is preparing to occupy for general manufacturing purposes a five-story concrete addition to its plant. It is reported that the company will erect a further addition on property acquired on Lombard street below Fremont. Buildings now on the site are being razed to reduce the fire risk to its adjacent properties. The company reports business as exceptionally good. Considerable export business to India, Germany, Russia, Japan and other countries is noted.

Secretary A. S. Goldsborough of the Municipal Factory Site Commission reports a rather slow development of projects under consideration. The proposition of locating a steel casting plant, in which Pittsburgh parties are interested, is still pending. Considerable literature is being sent out by the commission, giving important facts as to the industrial advantages of Baltimore as a center where water and railroad facilities are unsurpassed and sites for manufacturing establishments available.

The Chesapeake Iron Works has booked orders for the iron and steel work for the new Hopkins Exchange for a local telephone company, 75 tons; for school building No. 27, 125 tons, and a warehouse building in Richmond, Va., 75 tons, with numerous smaller contracts. While the plant is still below normal operations, the outlook for more active business conditions is favorable.

Dietrich Brothers have taken the contract to furnish and erect the structural steel work for the new Garrett

Building, about 500 tons. Contracts have also been entered for the steel work for an addition to the Guenther Brewery and for No. 22 school building, the latter requiring about 200 tons. Numerous small building propositions have also been booked. The fabricating department is fairly active.

Crook, Kries & Co. have received the contract to install a steam-heating system in the new station at Cumberland, Md., for the Western Maryland Railway. A steam-heating plant with a low-pressure boiler will be installed in the Fidelity Warehouse, at Hillen Station, this city. Contracts have also been signed for an extensive steam-heating system in the Mount Vernon mill of the Mount Vernon Cotton Duck Company. A number of small steam and hot-water-heating jobs have recently been taken and the plant is being operated at full capacity.

The T. C. Bashor Company reports more active conditions in September. Contracts have been entered for the installation of three 72-in. x 8-ft. return tubular boilers, an 18 x 36-in. Nagle Corliss engine and the necessary pumps, heater and piping for the power plant of the Crisfield Ice Mfg. Company, Crisfield, Md., recently destroyed by fire. Three water tube boilers, 250 hp. each, will be furnished the Western Maryland Railway—one at Hagerstown, Md., and two at Maryland Junction, W. Va. Orders for a large quantity of cast-iron pipe, valves and hydrants have also been received from the same company. While the machine shop department of the Bashor company is quite busy, that for the manufacture of boilers and tanks is only moderately active.

Riggs, Distler & Stringer, engineers, have the contract to install the heating plant in the new Garrett Building, taking 10,000 ft. of radiation, three boilers (type not yet decided upon), packless radiator valves, automatic vacuum valves and an electric vacuum pump with automatic control, all to be purchased. They also recently sold four vertical boilers of 40 hp. capacity and several low-pressure boilers. A 75-kw. Ames engine, direct connected with a General Electric generator, will be furnished to the Newbern Railway Company, Newbern, S. C. Several stationary vacuum cleaning plants have been sold, including one for the United Railways and one to be installed in a recently completed concrete residence.

The Iron and Metal Markets

Consumption Still Increasing More Price Advances, but Buying Is Unchecked

Pig Iron Output Greater, Stocks Less—Bars, Plates and Shapes Up \$1

Consumption of pig iron and of all forms of steel is still increasing. The week has brought fresh evidence of the fact in numerous price advances, in the reduction of pig iron stocks while production is increasing, in larger shipments from warehouses, and in the moving further forward of delivery dates of the mills.

Indications point to a continuance of all these conditions, with no signs as yet that higher prices have checked buying.

So much of the business entered for delivery this year must be carried over to 1913 that buyers are finding unexpected difficulty in placing material needed in the first quarter. Chicago district plate and structural mills have now practically come to the second quarter of 1913 so far as new bookings are concerned. One Pennsylvania steel company is so fully sold up that it will make no new sales whatever for 1913 until the situation at its mills is clearer.

Accumulating demand in the three heavy tonnage lines—bars, plates and structural shapes—has overridden quasi attempts to hold prices down, and this week the largest Pittsburgh company has advanced bars to 1.40c. and plates and shapes to 1.45c. Some sellers had already established these levels on considerable sales for next year. Rivets have been advanced \$1 a ton and one large producer has put up blue annealed sheets \$1, or to a 1.60c. basis for No. 10.

Railroad buying promises to figure largely for a long time. Of the 15,000 cars mentioned last week as pending, 3000 have been placed. Not all car builders are getting plates fast enough, and the low prices at which they sold cars preclude paying premiums to the few mills that can take on prompt business. But railroads are finding car works obdurate in their stand for a good advance in cars.

The New Haven and Boston & Maine rail orders are about closed and are expected to reach 50,000 tons. The Chicago & Alton is in the market for 8000 tons. At St. Louis the Wabash has placed 20,000 tons. At Pittsburgh the largest week's bookings in years are reported in light rails.

The largest structural item is 16,000 to 17,000 tons let to the American Bridge Company for the new Corrigan, McKinney & Co. steel works and finishing mills at Cleveland. In plates considerable car works business is pending, also 8000 to 9000 tons for the San Fernando syphon in the water pipe line for Los Angeles, Cal. An interesting report from San Francisco is of the capture of 3600 tons of large welded pipe by German makers for the Pacific Light & Power Company's penstock.

The inflow of orders in other finished lines shows no let-up. In bars it is most remarkable. A good many sheet mills having their own steel are sold up to April. Wire orders from Western districts have been good, but capacity is large, and prices do not go up as easily as in some other lines. In wire nails, in spite of reported advances, \$1.70 is the common price and \$1.65 has not disappeared.

Verified statistics of pig iron production in September show a total of 2,463,839 tons, or 82,128 tons a day, against 2,512,431 tons in August, or 81,046 tons a day. Merchant furnaces made the largest output since June 1910, at 23,026 tons a day, against 21,582 tons in August. Steel works furnaces fell off slightly. There was a gain of 10 in active furnaces to 266 on October 1, with a capacity of 83,426 tons a day. In the record average made in February, 1910, the output was 85,616 tons a day. Including charcoal iron, production is now at the rate of 30,800,000 tons a year, against 31,600,000 tons in February, 1910.

Stocks of pig iron in Ohio and Western Pennsylvania have been reduced at the rate of 1000 tons a day for the past six weeks. A few more furnaces will blow in, but coke scarcity and high cost are deterrent factors.

Higher pig iron is almost a day-to-day development. Large interests are the chief buyers. Sales of foundry iron have not been as heavy as in some recent weeks, but some furnace interests, finding themselves heavily sold for the first half have promptly put up prices, and apparently the end is not yet. In the East sales to pipe and radiator interests amounted to 35,000 tons.

Bessemer and basic pig iron in the Central West have advanced to \$17 and \$16 respectively at Valley furnace and the market is very firm. A 10,000 ton sale of basic was made to a steel foundry in the Shenango Valley. A St. Louis interest bought 10,000 tons and at Buffalo a sale of 30,000 tons was made involving the delivery of molten metal to a steel plant. A Western Pennsylvania steel company has bought 25,000 tons of Bessemer iron, largely a conversion deal. Little Bessemer iron is now available for first quarter delivery.

Blast furnace coke for prompt delivery has advanced sharply and sales have been made at \$3 to \$3.15. A contract for 5000 tons a month in the first half was made at \$2.60, but makers generally are holding for \$2.75 and up to \$3 for contract furnace coke.

The scrap market has been unusually active at Pittsburgh with advances of \$1 to \$1.50 a ton. Heavy melting scrap has sold at \$15.75 and dealers are now asking \$16.

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

Oct. 9, Oct. 2, Sept. 11, Oct. 11,

Pig Iron, Per Gross Ton:	1912.	1912.	1912.	1911.
Foundry No. 2, standard, Philadelphia	\$17.25	\$17.00	\$16.50	\$15.00
Foundry No. 2, Valley furnace	15.75	15.50	14.25	13.50
Foundry No. 2, Southern, Cincinnati	16.75	16.50	15.75	13.25
Foundry No. 2, Birmingham, Ala.	13.50	13.25	12.50	10.00
Foundry No. 2, at furnace, Chicago*	17.00	16.50	15.50	14.50
Basic, delivered, eastern Pa.	17.00	16.50	16.50	14.50
Basic, Valley furnace	16.00	15.50	14.25	12.50
Bessemer, Pittsburgh	17.90	17.40	15.90	15.40
Malleable Bessemer, Chicago	17.00	17.00	15.50	14.50
Gray forge, Pittsburgh	16.25	15.90	14.65	13.65
Lake Superior charcoal, Chicago	18.75	17.75	16.75	16.50

Billets, etc. Per Gross Ton:	25.00	25.00	23.50	20.00
Bessemer billets, Pittsburgh	25.00	26.00	24.00	19.00
Open hearth billet, Pittsburgh	32.00	32.00	32.00	25.00
Forging billet, Pittsburgh	28.00	28.00	25.90	21.40
Open hearth billets, Philadelphia	28.50	28.00	27.00	26.00
Wire rods, Pittsburgh				

Old Material, Per Gross Ton:	17.50	17.50	16.50	13.75
Iron rails, Chicago	17.50	17.00	17.00	16.50
Iron rails, Philadelphia	15.50	15.50	14.25	12.50
Car wheels, Chicago	14.50	14.25	14.25	11.75
Car wheels, Philadelphia	15.75	15.00	14.00	12.00
Heavy steel scrap, Pittsburgh	13.50	13.25	12.25	10.00
Heavy steel scrap, Chicago	14.50	14.50	14.50	12.00
Heavy steel scrap, Philadelphia				

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Finished Iron and Steel,

	Oct. 9, 1912.	Oct. 2, 1912.	Sept. 11, 1912.	Oct. 11, 1911.
Per Pound to Largest Buyers:	Cents.	Cents.	Cents.	Cents.
Bessemer rails, heavy, at mill..	1.25	1.25	1.25	1.25
Iron bars, Philadelphia.....	1.55	1.52½	1.42½	1.22½
Iron bars, Pittsburgh.....	1.50	1.50	1.50	1.20
Iron bars, Chicago.....	1.50	1.50	1.45	1.20
Steel bars, Pittsburgh.....	1.40	1.35	1.30	1.15
Steel bars, tidewater, New York.....	1.54	1.51	1.46	1.31
Tank plates, Pittsburgh.....	1.45	1.40	1.40	1.20
Tank plates, tidewater, New York.....	1.61	1.56	1.56	1.36
Beams, Pittsburgh.....	1.45	1.40	1.35	1.20
Beams, tidewater, New York.....	1.61	1.56	1.56	1.36
Angles, Pittsburgh.....	1.45	1.40	1.35	1.20
Angles, tidewater, New York.....	1.61	1.56	1.56	1.36
Skelp, grooved steel, Pittsburgh.....	1.30	1.30	1.30	1.15
Skelp, sheared steel, Pittsburgh.....	1.35	1.35	1.35	1.25

Sheets, Nails and Wire,

	Cents.	Cents.	Cents.	Cents.
Per Pound to Largest Buyers:				
Sheets, black, No. 28, Pittsburgh.....	2.15	2.15	2.05	1.85
Wire nails, Pittsburgh.....	1.70	1.70	1.70	1.65
Cut nails, Pittsburgh.....	1.60	1.60	1.60	1.50
Fence wire, ann'd. 0 to 9, Pgh.....	1.50	1.50	1.50	1.45
Barb wire, galv., Pittsburgh.....	2.00	2.00	2.00	1.95

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt shipment.....	\$3.15	\$2.65	\$2.25	\$1.50
Furnace coke, future delivery.....	2.50	2.50	2.25	1.60
Foundry coke, prompt shipment.....	\$3.25	3.00	2.40	1.80
Foundry coke, future delivery.....	3.00	3.00	2.50	2.00

Metals, Per Pound:

	Cents.	Cents.	Cents.	Cents.
Lake copper, New York.....	17.87½	17.87½	17.65	12.50
Electrolytic copper, New York.....	17.70	17.70	17.62½	12.25
Spelter, St. Louis.....	7.45	7.50	7.30	6.00
Spelter, New York.....	7.60	7.65	7.45	6.15
Lead, St. Louis.....	4.95	4.95	4.95	4.10
Lead, New York.....	5.10	5.10	5.10	4.25
Tin, New York.....	50.00	50.25	48.62½	41.25
Antimony, Hallett, New York.....	\$0.50	9.37½	7.87½	7.70
Tin plate, 100 lb. box, Pittsburgh.....	\$3.60	\$3.60	\$3.60	\$3.60

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Louis, 22½c.; Kansas City, 42½c.; Omaha, 42½c.; St. Paul, 32c.; Denver, 84½c.; New Orleans, 30c.; Birmingham, Ala., 45c.; Pacific coast, 80c. on plates, structural shapes and sheets No. 11 and heavier; 85c. on sheets Nos. 12 to 16; 95c. on sheets No. 16 and lighter, 65c. on wrought pipe and boiler tubes.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.45c., base, net cash, 30 days. Following are stipulations prescribed by manufacturers, with extras:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼ in. and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per sq. ft., are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft., to take base price. Plates over 72 in. wide ordered less than 11 lb. per sq. ft. down to the weight of 316 in., take the price of 3-16 in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Extras.	Cents per lb.
Gauges under ¼ in. to and including 3-16 in.....	.10
Gauges under 3-16 in. to and including No. 8.....	.15
Gauges under No. 8 to and including No. 9.....	.25
Gauges under No. 9 to and including No. 10.....	.30
Gauges under No. 10 to and including No. 12.....	.40
Sketches (including straight taper plates) 3 ft. and over	.10
Complete circles, 3 ft. in diameter and over.....	.20
Boiler and flange steel.....	.10
"A. B. M. A." and ordinary firebox steel.....	.20
Still bottom steel.....	.30
Marine steel.....	.40
Locomotive fire box steel.....	.50
Widths over 100 in. up to 110 in., inclusive.....	.05
Widths over 110 in. up to 115 in., inclusive.....	.10
Widths over 115 in. up to 120 in., inclusive.....	.15
Widths over 120 in. up to 125 in., inclusive.....	.25
Widths over 125 in. up to 130 in., inclusive.....	.30
Widths over 130 in.....	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inc.....	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inc.....	.50
Cutting to lengths or diameters under 1 ft.....	1.55
No charge for cutting rectangular plates to lengths 3 ft. and over.	

Wire Rods and Wire.—Bessemer, open heart and chain rods, \$28.50. Fence wire, Nos. 0 to 9, per 100 lb., terms 60 days or 2 per cent. discount in 10 days, carload lots to jobbers, annealed, \$1.50; galvanized, \$1.80. Galvanized barb wire, to jobbers, \$2; painted, \$1.70. Wire nails to jobbers, \$1.70.

The following table gives the price to retail merchants on fence wire in less than carloads, with the extras added to the base price:

Nos.	0 to 9	10	11	12	12½	13	14	15	16
Annealed	\$1.65	\$1.70	\$1.75	\$1.80	\$1.80	\$1.90	\$2.00	\$2.10	\$2.20
Galvanized	1.95	2.00	2.05	2.10	2.20	2.30	2.40	2.50	2.60

Structural Material.—I-beams, 3 to 15 in.; channels, 3 to 15 in.; angles, 3 to 6 in., on one or both legs, ¼ in. and over, and zees, 3 in. and over, 1.45c. Other shapes and sizes are quoted as follows:

	Cents per lb.
I-beams over 15 in.....	1.50 to 1.55
I-beams over 18 in.....	1.50 to 1.55
Angles over 6 in.....	1.50 to 1.55
Angles, 3 in. on one or both legs, less than ½ in. thick, plus full extras, as per steel bar card Sept. 1, 1909.....	1.50 to 1.55
Tees, 3 in. and up.....	1.50 to 1.55
Angles, channels and tees, under 3 in. plus full extras as per steel bar card Sept. 1, 1909.....	1.50 to 1.55
Deck beams and bulb angles.....	1.75 to 1.80
Hand rail tees.....	2.20 to 2.30
Checkered, trough and corrugated floor plates.....	2.35 to 2.55

Extras for Cutting to Length.

	Cents per lb.
Under 3 ft., to 2 ft. inclusive.....	.25
Under 2 ft., to 1 ft. inclusive.....	.50
Under 1 ft.....	1.55
No charge for cutting to lengths 3 ft. and over.	

Sheets.—Makers' prices for mill shipments on sheets of U. S. Standard gauge, in carload and larger lots, on which jobbers charge the usual advance for small lots from store, are as follows, f.o.b. Pittsburgh, terms 30 days net or 2 per cent. cash discount in 10 days from date of invoice:

Blue Annealed Sheets.

	Cents per lb.
Nos. 3 to 8.....	1.55
Nos. 9 and 10.....	1.60
Nos. 11 and 12.....	1.65
Nos. 13 and 14.....	1.70
Nos. 15 and 16.....	1.75

Box Annealed Sheets, Cold Rolled.

Nos. 10 and 11.....	1.80
No. 12.....	1.80
Nos. 13 and 14.....	1.85
Nos. 15 and 16.....	1.90
Nos. 17 to 21.....	1.95
Nos. 22 and 24.....	2.00
Nos. 25 and 26.....	2.05
No. 27.....	2.10
No. 28.....	2.15
No. 29.....	2.20
No. 30.....	2.30

Galvanized Sheets of Black Sheet Gauge.

Nos. 10 and 11.....	2.30
No. 12.....	2.40
Nos. 13 and 14.....	2.40
Nos. 15 and 16.....	2.55
Nos. 17 to 21.....	2.70
Nos. 22 and 24.....	2.85
Nos. 25 and 26.....	3.00
No. 27.....	3.15
No. 28.....	3.30
No. 29.....	3.45
No. 30.....	3.60

Effective April 18, 1912, the rates for painted and formed roofing sheets, per 100 lb., are based on the following extras for painting and forming over prices for corresponding gauges in black and galvanized sheets:

Corrugated Roofing Sheets by Weight.

	29	25 to 28	19 to 24	12 to 18
Painting.				
Regular or oiling.....	.15	.10	.05	.05
Graphite, regular.....	.25	.15	.10	.10
Forming.				
2, 2½, 3 and 5 in. corrugated.....	.05	.05	.05	.05
½ V-crimped, without sticks.....	.05	.05	.05	...
¾ to 1¼ in. corrugated.....	.10	.10	.10	...
¾ V-crimped, without sticks.....	.10	.10	.10	...
Pressed standard seam, with cleats.....	...	.15	.15	...
Plain roll roofing, with or without cleats.....	.15	.15	.15	...
Plain brick siding.....	...	.20	...	...
3-15-in. crimped.....	.20	.20	.20	...
Weatherboard siding.....	...	.25	.25	...
Beaded ceiling.....	...	.25	.25	...
Rock face brick and stone siding.....	...	.25	.25	...
Roll and cap roofing, with caps and cleats.....	.25	.25	...	...
Roofing valley, 12 in. and wider.....	...	.25	.25	...
Ridge roll and flashing (plain or corrugated).....	...	.65	.65	.65

Boiler Tubes.—Discounts on lap welded steel and standard charcoal iron boiler tubes to jobbers in carloads are as follows:

Steel.	Standard Charcoal Iron.
1¼ to 2¼ in.....	62
2½ in.....	64½
2¾ to 3¼ in.....	69½
3½ to 4 in.....	72
5 and 6 in.....	64½
7 to 13 in.....	62
1½ in.....	46
1¾ to 2¼ in.....	48
2½ in.....	53
2¾ to 3¼ in.....	55½
3½ to 5 in.....	58
Locomotive and steamship special grades bring higher prices.	

2¼ in. and smaller, over 18 ft., 10 per cent. net extra.

2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads will be sold at the delivered discounts for carloads, lowered by two points for lengths 22 ft. and under to destinations east of the Mississippi River; lengths over 22 ft. and all shipments going west of the Mississippi River must be sold f.o.b. mill at Pittsburgh basing discount, lowered by two points.

Railroad; 500 steel underframes for the Chicago, Burlington & Quincy; 3000 box and 1500 refrigerator cars for the Northern Pacific; 1000 gondolas and 200 flat cars for the Kansas City Southern; 2000 box cars and 500 gondolas for the Missouri, Kansas & Texas. The Baltimore & Ohio Railroad has placed 500 center sills with the Pressed Steel Car Company and 500 with the Ralston Steel Car Company. An inquiry is in the market for 8000 to 9000 tons of plates for the San Fernando siphon, being one of the sections for the new line for supplying water to the city of Los Angeles, Cal. There are also inquiries for the plates and shapes for 12 torpedo boat destroyers to be built by the Government, each boat requiring about 200 tons of plates and shapes. On October 7 the Carnegie Steel Company advanced its price on plates to 1.45c. minimum, but this price had been quoted by other plate mills for some time. Premiums of \$2 to \$3 a ton are readily paid over this price for prompt delivery. We now quote $\frac{1}{4}$ in. and heavier plates at 1.45c. minimum, Pittsburgh, for next year, and up to 1.60c. for delivery within two or three weeks.

Iron and Steel Bars.—Effective October 7, the Carnegie Steel Company advanced its price on steel bars to 1.40c. minimum, and this advance will no doubt be adopted by the other steel bar mills. None of them can take on new business for this year and any contracts taken are for shipment in first quarter or first half. Very heavy contracts have been placed for first quarter and first half. The amount of new business thus taken since makers announced their willingness to accept contracts at 1.35c. is very much greater than had been expected. They are not able to catch up and will carry over into next year a good deal of tonnage that should have been delivered this year. The bar iron mills are also very busy and are back in deliveries four to six weeks or longer. We quote steel bars at 1.35c. and iron bars at 1.50c., f.o.b. Pittsburgh. Makers of steel bars quote \$1 extra per net ton for twisting bars, $\frac{3}{4}$ in. and larger, and \$2 extra for $\frac{1}{2}$ to $\frac{5}{8}$ in.

Hoops and Bands.—The new demand is fairly heavy, but most consumers are covered by contracts. All the mills are much behind in deliveries, and have their product practically sold up for the next three months or longer. We quote steel bands at 1.35c., with extras as per the steel bar card, and hoops at 1.45c., Pittsburgh, for this year and first quarter of next year.

Sheets.—Practically all mills have adopted the change in differentials on galvanized sheets announced recently by the Youngstown Sheet & Tube Company. The new demand continues heavy, consumers being anxious to cover their requirements for first quarter and first half of next year at present prices. A good deal of tonnage has thus been placed with the chances that much more will be closed within the next month. All the sheet mills are running to full capacity, and some have practically enough business booked to take their entire output up to April 1. Mills that can make reasonably prompt deliveries are able to get premiums of \$2 a ton over regular prices, and two or three mills are now quoting 2.25c. minimum on No. 28 black sheets, and 3.35c. on 28 galvanized. Regular prices are 1.55c. to 1.60c. for No. 10 blue annealed; 2.15c. to 2.20c. for No. 28 black, and 3.30c. to 3.35c. for No. 28 galvanized in carload and larger lots, f.o.b. Pittsburgh. Jobbers charge the usual advances over these prices for small lots from store.

Tin Plate.—A fairly large tonnage has been taken by the mills for delivery in first quarter at the \$3.60 price, but makers are pursuing a rather conservative policy in such sales, as they do not know what tin bars or pig tin will then cost. Specifications against contracts have fallen off, as it is now close to the end of the season, but the mills will likely continue to operate to full capacity, making up stock that will be wanted on contracts for next year. All the leading mills are running practically full, operations having been restricted somewhat by the scarcity of labor and of steel. We quote \$3.60 per base box for 14x20 coke plates, f.o.b. Pittsburgh, for delivery over remainder of this year and first quarter of next year.

Shafting.—The new demand continues heavy. All the makers of shafting have their product pretty well sold for the next three months and are still back in shipments. A fair amount has been placed for delivery in first quarter. We quote cold rolled shafting firm at 60 per cent. off in carload and larger lots and 55 per cent. in small lots in base territory.

Bolts and Rivets.—Another advance of \$1 a ton has been made in prices of rivets, and we now quote button head structural rivets at \$1.95 per 100 lb. base, and cone

head boiler rivets at \$2.05, in carloads, an advance of about 10c. being charged for smaller lots. The mills are flooded with orders, being back in deliveries from six to eight weeks or longer. It is probable that another advance in prices of bolts will be made next week. Present discounts are as follows: Coach and lag screws, 80 and 12 $\frac{1}{2}$ per cent. off; small carriage bolts, cut threads, 75, 10 and 2 $\frac{1}{2}$ per cent. off; small carriage bolts, rolled threads, 75, 10, 2 $\frac{1}{2}$, 7 $\frac{1}{2}$ per cent. off; large carriage bolts, 70, 10 and 2 $\frac{1}{2}$ per cent. off; small machine bolts, rolled threads, 75, 10, 7 $\frac{1}{2}$ per cent. off; small machine bolts, cut threads, 75, 10, 5 per cent. off; large machine bolts, 70, 10 and 10 per cent. off; square hot pressed nuts, blank and tapped, \$5.90 off, and hexagon nuts, \$6.55 off. These prices are in lots of 300 lb. or over, delivered within a 20c. freight radius of maker's works.

Spelter.—The market is very strong. We quote prime grades of Western at 7.45c., equal to 7.57 $\frac{1}{2}$ c., Pittsburgh. A local pipe mill is reported to have contracted for 200 tons at this price.

Railroad Spikes.—All the spike mills report the booking of more tonnage than they are turning out. They are getting steadily further back in deliveries. Some makers are not accepting any new orders for delivery before the first quarter. Prices are very strong, but unchanged. We quote railroad spikes in base sizes, 5 $\frac{1}{2}$ x9-16 in., and also small railroad and boat spikes at \$1.80 per 100 lb., f.o.b. Pittsburgh, for remainder of this year and first quarter of 1913.

Wire Products.—The new demand continues heavy and consumers are specifying very freely against their contracts. The mills are urging customers to get in specifications early, so that they can rush fall shipments in view of the car shortage, which is expected to get worse. It is the general expectation that an advance of 5c. to 10c. per keg on wire nails will be made before this week is out. One leading mill will likely withdraw all prices in a day or two. We quote wire nails at \$1.70 per keg; cut nails, \$1.60 to \$1.65; galvanized barb wire, per 100 lb., \$2; painted, \$1.70; annealed fence wire, \$1.50, and galvanized fence wire, \$1.80, f.o.b. Pittsburgh, usual terms, freight added to point of delivery. Jobbers charge the usual advances over these prices for small lots from store.

Merchant Steel.—Mills expect that shipments this month will be much heavier than in September, as the new demand continues heavy, and specifications against contracts are still coming in very freely. Prices are very strong and we quote: Iron finished tire, 1 $\frac{1}{2}$ to $\frac{3}{4}$ in. and larger, 1.30c., base; under $\frac{3}{4}$ in., 1.40c.; planished tire, 1.50c.; channel tire, $\frac{3}{4}$, $\frac{7}{8}$ and 1 in., 1.80c.; 1 $\frac{1}{8}$ in. and larger, 1.65c.; toe calk, 1.85c., base; flat sleigh shoe, 1.35c.; concave and convex, 1.70c.; cutter shoes, tapered or bent, 2.30c.; spring steel, 1.90c.; machinery steel, smooth finish, 1.70c., all f.o.b. cars, Pittsburgh.

Merchant Pipe.—Under date of October 1 the Reading Iron Company, Reading, Pa., issued a new card on iron pipe and is now quoting the same discounts on 2 $\frac{1}{2}$ to 6 in. lap weld iron pipe, this being an advance of one point, or \$2 a ton, on 4 in. None of the local pipe mills has as yet adopted this card. The new demand for iron and steel pipe continues very heavy, and mills report they are turning down business every day, being unable to make the deliveries wanted. No large inquiries for line pipe are in the market, but a good many projects are talked about, and if only half of them develop it will mean a very heavy tonnage of large pipe; none of this, however, may be wanted before next year. All the mills have their product well sold up over the next two or three months, and premiums are being offered for prompt deliveries.

Boiler Tubes.—All the mills making locomotive and merchant tubes are sold up for two or three months and two of the leading mills are not accepting any new business for delivery before first quarter, while the new demand for locomotive and merchant tubes continues heavy. Regular discounts are being firmly held.

Iron and Steel Scrap.—The local market is excited and prices on nearly all grades have advanced from \$1 to \$1.50 per ton. On Monday a local consumer paid \$16 for upward of 5000 tons of selected heavy melting scrap, and would probably take in more at the same price. It is stated that a good part of the heavy steel scrap and rerolling rails offered in the last list of the Pennsylvania Railroad was bought by a steel concern located on its line. The consumption of steel making scrap is heavier than ever known in the history of the trade. A heavy demand is experienced for low phosphorus melting stock and for bundled sheet scrap. The only dull items are borings and turnings, for which

there is not much demand. We note sales of 1000 tons of low phosphorus melting stock at about \$18; 1000 tons of wrought iron turnings at about \$11; 800 tons of borings at \$10, and 600 tons of bundled sheet scrap at \$13.25, all delivered at consumer's mills. It is stated that two local consumers have to-day offered \$15.75 for very large lots of heavy steel scrap without getting the material. Dealers are now quoting as follows, per gross ton:

Heavy steel scrap, Steubenville, Follansbee, Brackenridge, Sharon, Monessen and Pittsburgh delivery	\$15.75 to \$16.00
No. 1 foundry cast	14.00 to 14.25
No. 2 foundry cast	13.00 to 13.25
Bundled sheet scrap, f.o.b. consumers' mills Pittsburgh district	13.25 to 13.50
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 16.75
No. 1 railroad malleable stock	14.25 to 14.50
Grate bars	10.00 to 10.25
Low phosphorus melting stock	18.25 to 18.50
Iron car axles	26.00 to 26.25
Steel car axles	18.00 to 18.25
Locomotive axles, steel	22.00 to 22.25
Locomotive axles, iron	28.00 to 28.25
No. 1 busheling scrap	14.00 to 14.25
No. 2 busheling scrap	10.00 to 10.25
Old car wheels	15.00 to 15.25
*Cast-iron borings	10.00 to 10.25
*Machine shop turnings	11.00 to 11.25
†Sheet bar crop ends	16.50 to 16.75
Old iron rails	16.50 to 16.75
No. 1 R. R. wrought scrap	15.25 to 15.50
Heavy steel axle turnings	12.50 to 13.00
Stove plate	10.25 to 10.50

*These prices are f.o.b. cars at consumers' mills in the Pittsburgh district.
†Shipping point.

Coke.—The unusual condition prevails of prompt furnace coke selling fully 50c. a ton higher than contract coke. This is due partly to the scarcity of coke for prompt shipment and partly because some makers have their entire output under contract. Sales of fully 10,000 tons or more of standard makes of prompt furnace coke have been made at \$3 to \$3.15 at oven. A Youngstown steel company paid \$3.15 for about 500 tons of spot coke. A contract has been made for 5000 tons per month of high grade coke for cupola purposes to be supplied to a large steel concern at \$2.75 per net ton at oven. A New York furnace company has contracted for 5000 tons per month over first half of next year at \$2.60 at oven. This is carefully selected coke to be used in making low sulphur iron. Some furnace owners, who have not covered for next year, have inquiries out for a good deal of tonnage. This could readily be closed at \$2.50 at oven, but most coke makers are now holding off, believing the price will go to \$2.75 or \$3 before the first of the year. We quote standard makes of furnace coke for prompt shipment at \$3 to \$3.15 and for delivery in the first half of 1913 at \$2.50 to \$2.75 per net ton at oven, but so far no contracts have been closed at the higher price. Foundry coke has sold in small lots for prompt shipment as high as \$3.25 per net ton at oven. We quote standard 72-hr. foundry coke at \$3 to \$3.25, prompt at \$2.75 to \$3 on contract per net ton at oven.

Chicago

CHICAGO, ILL., October 8, 1912.

For the users of finished steel, particularly of structural shapes, the market situation grows increasingly restricted. In many instances fabricators and workers in steel plate will have to depend entirely upon material out of store to cover work they may take into their shop after the first of the year. They are making an effort to protect themselves as far as possible by ordering for stock, but by far the larger proportion of these orders cannot be delivered until the second quarter of the year. Some of the mills are accepting new business only in the form of stock specifications, while others require that contracts be limited to the remainder of this year. Specifications to be made up by that time. An unprecedented tonnage will be carried over. Already warehouse stocks are demoralized, and in some sizes of beams and plates there is practically no material available in this market. Warehouse prices on bars, plates and structural shapes have been advanced \$1 per ton. Figures for the first nine months of the year indicate that the total steel tonnage specified in 1912 will double that of 1911 and treble that of 1910. Prices of structural shapes and plates have advanced \$1 a ton and the minimum for steel bars is now 1.40c., Pittsburgh.

Pig Iron.—The local market appears to have regained its equilibrium and buying is again on a normal scale. That portion of the recent St. Louis inquiry for

basic that was placed was distributed in part through local agencies and in part to the South. Several sales of 500 to 2500 tons of foundry and malleable iron are noted. Local furnaces are asking a minimum of \$17 and some interests are declining orders at less than \$17.50. For Southern iron the price remains the same as a week ago, namely, \$13.50 for iron to be delivered through the first quarter, with an advance of 50c. for second quarter. Lake Superior charcoal iron, the heavy selling of which was continued through September, has been advanced to the basis of \$18.75, Chicago, with a maximum differential of \$1.50 per ton above that for other grades. Ohio high silicon irons have also been advanced \$1 a ton. Practically no relief appears in the coke situation, and deliveries are far behind shipping instructions. Prompt shipment coke is being sold here at prices around \$3.40, at oven, for Connellsville. We quote local irons, f.o.b. furnace, the average switching charge to Chicago foundries being nearly 50c. per ton. Other quotations are for Chicago delivery. Prices on prompt shipment are as follows:

Lake Superior charcoal	\$18.75 to \$19.25
Northern coke foundry, No. 1	17.50 to 18.00
Northern coke foundry, No. 2	17.00 to 17.50
Northern coke foundry, No. 3	16.50 to 17.00
Northern Scotch, No. 1	17.50 to 18.00
Southern coke, No. 1 foundry and No. 1 soft	18.35
Southern coke, No. 2 foundry and No. 2 soft	17.85
Southern coke, No. 3	17.35
Southern coke, No. 4	16.85
Southern gray forge	16.35
Southern mottled	16.35
Malleable Bessemer	17.00
Standard Bessemer	17.50 to 18.00
Basic	17.00
Jackson Co. and Kentucky silvery, 6 per cent.	19.40 to 20.40
Jackson Co. and Kentucky silvery, 8 per cent.	20.40 to 21.40
Jackson Co. and Kentucky silvery, 10 per cent.	21.40 to 22.40

Rails and Track Supplies.—It is reported that the Chicago, Milwaukee & St. Paul Railroad has finally closed negotiations for 1913 rails to the amount of 65,000 tons. The Chicago & Alton is in the market for about 8000 tons. It is also known that a large tonnage of track fastenings is on the point of closing, following which current minimum prices for spikes and track bolts are likely to be entirely withdrawn. Quotations on new business are all at higher levels. We quote standard railroad spikes at 1.90c. to 2c., base; track bolts with square nuts, 2.25c. to 2.30c., base, all in carload lots, Chicago; tie plates, \$30 to \$32.50 net ton; standard section Bessemer rails, Chicago, 1.25c., base; open hearth, 1.34c.; light rails, 25 to 45 lb., 1.25c.; 16 to 20 lb., 1.30c.; 12 lb., 1.35c.; 8 lb., 1.40c.; angle bars, 1.50c., Chicago.

Structural Material.—The mill situation with respect to structural material is unprecedented. The requirements of large buyers, and in fact almost for general consumption in the first six months of the year, are being arranged for only with the greatest difficulty. One of the leading Western roads, which is planning to build 3000 cars and a number of locomotives at its own shops in the first six months of the year, is being considerably embarrassed by inability to place its orders as usual. Mill prices on structural shapes have advanced to the minimum of 1.45c. Pittsburgh. With the exception of 2700 tons of bridge material for the Great Northern Railway, awarded to the Wisconsin Bridge Company, and 1340 tons for the Ninety-second street bridge at Chicago, placed with the Toledo Bridge & Crane Company, orders for fabricated steel the past week were light and included 650 tons for the Chicago & Alton Railway to the American Bridge Company; 276 tons for the Walker apartment building, Chicago, to Noelke-Richards Iron Works; 138 tons for the Parmalee Transfer Company's garage, Chicago, to the Vierling Steel Company, and 145 tons for the University of Minnesota to the St. Paul Foundry Company. We quote for Chicago delivery, mill shipment, on plain shapes 1.63c. to 1.83c.

Warehouse stocks of structural material have been almost wrecked by the tremendous demand upon them, and, in some sizes, angles and beams are scarcely to be had. Instances are noted of inquiries for structural material amounting to 600 and 800 tons. We quote, for base sizes from store, 2.05c.

Plates.—Plate business for delivery in 1913, of which a considerable tonnage has been placed, seems to have been taken by the mills, not upon contracts extending into next year, but either as spot specifications or as contracts ending with 1912, specifications to be made before that time or upon specific orders to cover particular contracts made by the consumer. A tremendous tonnage will be carried over into next year on the books of all the larger mills and deliveries on current specifications are apparently impossible before the second quarter. Prices have advanced \$1 per ton and we quote for Chicago delivery, mill shipment, 1.63c. to 1.83c.

The volume of premium business in plates is apparently increasing rather than otherwise, and jobbers whose stocks have been heavily depleted are paying as much as \$4 per ton for prompt shipment, while $\frac{3}{4}$ -in. plate is exceedingly difficult to obtain in this market at any price. We quote for delivery from store, 2.05c. base.

Sheets.—Higher prices for both black and galvanized sheets in this market evidence the increasing scarcity of prompt shipment material. Contracts for forward delivery can be placed at much better prices. We quote for Chicago delivery, in carload lots from mill, as follows: No. 28 black sheets, 2.38c.; No. 28 galvanized, 3.58c., and No. 10 blue annealed, 1.78c. to 1.88c.

The sheet trade also evidences the important position now occupied by jobbers, an inquiry for 560 tons of sheets being noted. The condition of jobbers' stocks is also indicated by an order for 86 tons of sheets for which no better delivery than six weeks could be promised. We quote on sheets from jobbers' stocks as follows: No. 10 blue annealed, 2.15c.; No. 28 black, 2.70c.; No. 28 galvanized, 3.95c.

Bars.—It is no longer possible to obtain steel bars on the basis of 1.35c. Pittsburgh, minimum quotations now prevailing being \$1 a ton higher. For hard steel bars there is practically but one local mill in position to accept orders for reasonably prompt delivery, and very little material can be obtained for less than 1.60c. Bar iron continues to be quoted on the basis of 1.50c. Chicago. We quote for mill shipment as follows: Bar iron, 1.50c.; soft steel bars, 1.53c. to 1.65c.; hard steel bars, 1.40c. to 1.60c.; shafting in carloads, 60 per cent. off; L.C.L., 55 per cent. off.

For delivery from store, we quote soft steel bars, 1.95c.; bar iron, 1.95c.; reinforcing bars, 1.95c. base with 5c. extra for twisting in sizes $\frac{3}{4}$ in. and over, and $7\frac{1}{2}$ c. extra for smaller sizes; shafting 55 per cent. off.

Rivets and Bolts.—The retarded deliveries on bolts from mill have become so magnified as to necessitate additional buying on the part of many consumers for prompt shipment. Rivet users are more fortunate, however, and not only are contracts being executed with reasonable promptness but individual orders can be filled for early shipment by local mills. We quote from mill as follows: Carriage bolts up to $\frac{3}{4}$ in. x 6 in., rolled thread, 75-10-7 $\frac{1}{2}$; cut thread, 75-10-2 $\frac{1}{2}$; larger sizes, 70-10; machine bolts up to $\frac{3}{4}$ in. x 4 in., rolled thread, 75-10-2 $\frac{1}{2}$; cut thread, 75-10-7 $\frac{1}{2}$; large sizes, 75-10-5; coach screws, 80-12 $\frac{1}{2}$; hot pressed nuts, square head, \$5.90 off per cwt.; hexagon, \$6.55 off per cwt. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 1.98c. to 2.08c., base, Chicago, in carload lots; boiler rivets, 0.10c. additional.

The store trade in bolts has grown into large proportions and one order for 260 tons of bolts out of store is noted. Out of store we quote for structural rivets, 2.20c., and for boiler rivets, 2.30c. to 2.50c. Machine bolts up to $\frac{3}{4}$ x 4 in., 75-5; larger sizes, 70-5; carriage bolts up to $\frac{3}{4}$ x 6 in., 75 off; larger sizes, 70 off.

Old Material.—Prices for scrap continue to advance rapidly, but with no marked regularity. Buying is somewhat freer and accordingly the volume of material moving in the market is larger, although the tendency among the gatherers of scrap to hold the material as long as possible naturally continues to prevail. Apparent scarcity of various grades of scrap in the market is largely artificial, as dealers' stocks are normally large. We quote for delivery at buyer's works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton.	
Old iron rails	\$17.50 to \$18.00
Old steel rails, rerolling	15.75 to 16.25
Old steel rails, less than 3 ft.	14.50 to 15.00
Relaying rails, standard section, subject to inspection	24.00
Old car wheels	15.50 to 16.00
Heavy melting steel scrap	13.50 to 14.00
Frogs, switches and guards, cut apart	13.50 to 14.00
Shoveling steel	13.25 to 13.75
Steel axle turnings	10.75 to 11.25

Per Net Ton.	
Iron angles and splice bars	\$16.00 to \$16.50
Iron arch bars and transoms	17.50 to 18.00
Steel angle bars	13.00 to 13.50
Iron car axles	22.00 to 22.50
Steel car axles	17.75 to 18.25
No. 1 railroad wrought	14.00 to 14.50
No. 2 railroad wrought	13.00 to 13.50
Cut forge	12.75 to 13.25
Steel knuckles and couplers	12.50 to 13.00
Steel springs	13.00 to 13.50
Locomotive tires, smooth	14.00 to 14.50
Machine shop turnings	8.75 to 9.25
Cast and mixed borings	7.75 to 8.25
No. 1 busheling	12.00 to 12.50
No. 2 busheling	9.00 to 9.50
No. 1 boilers, cut to sheets and rings	9.00 to 9.50
Boiler punchings	12.75 to 13.25
No. 1 cast scrap	13.75 to 14.25
Stove plate and light cast scrap	11.50 to 12.00
Railroad malleable	13.50 to 14.00
Agricultural malleable	11.75 to 12.25
Pipes and flues	11.00 to 11.50

Cast Iron Pipe.—The approaching winter promises little in the way of municipal lettings for pipe, but the advancing price of pig iron may lead to an earlier buy-

ing than usual, particularly of gas pipe. A letting of 750 tons at Bridgeport, Ill., is reported, and one of 160 tons at Minster, Ohio. We quote as follows per net ton, Chicago: Water pipe, 4 in., \$30; 6 to 12 in., \$28; 16 in. and up, \$27, with \$1 extra for gas pipe.

Wire Products.—The demand has become so heavy as to make the question of a sufficient supply of semi-finished material important. Wire rods have been advanced to \$28 per ton as a means toward conserving the supply. Prices are decidedly firm, and in some instances where business is being accepted for 1913 delivery an advance of \$1 a ton is being asked. We quote plain wire, No. 9 and coarser, base, \$1.68; wire nails, \$1.88; painted barb wire, \$1.88 to \$1.93; galvanized, \$2.18; polished staples, \$1.93; galvanized, \$2.23, all Chicago.

Philadelphia

PHILADELPHIA, PA., October 8, 1912.

The demand continues good. Advances continue to be made as sellers fill up order books, consumers paying the higher prices quite freely. A trifle more forward business has been placed in finished material, but producers of pig iron are still disinclined to quote for extended shipment. Foundry iron shows an advance of 25c. over last week's minimum and some makes are extremely scarce for fourth quarter. Premiums are being paid for prompt sheets. Further sales of open-hearth rolling billets have been made for first quarter at \$28, delivered. Coke is scarce and commands much higher prices. In old material activity is largely confined to rolling mill grades.

Iron Ore.—Some sellers are still withholding quotations for 1913. Foreign ore is practically at a standstill, prohibitive freights and a scarcity of bottoms restricting shipments of European ores. Importations during the week include 22,600 tons of Cuban and 4795 tons of Spanish ore.

Pig Iron.—A very fair volume of business has been moving in foundry grades, mostly for fourth quarter, with some little for first quarter. Producers are keeping out of the market as much as possible, trying to confine sales to regular customers. Several producers announce further advances, some brands of standard eastern Pennsylvania No. 2 X being quoted at \$17, furnace, minimum, equal in instances to \$17.75, delivered here, for fourth quarter, and sales have been made on that basis. There are, however, a few who will take business from regular customers at \$17.25 for No. 2 X, the differential for No. 2 plain being 25c. Cast iron pipe makers continue the most important buyers. One Delaware River consumer, who recently purchased 5000 tons of low grade iron, has taken 10,000 tons additional, divided among several producers. This grade is now selling at \$16, furnace, equal to \$16.50 to \$16.75, delivered. Another pipe maker has closed against a recent inquiry for 5000 tons, while still another has been taking a considerable quantity, mostly in small lots. A Virginia pipe maker bought 3000 tons of Virginia low grade, paying \$14.50, furnace, for No. 3. The Baldwin Locomotive Works has closed against its recent inquiry for several thousand tons of foundry forge for first quarter. Stove foundries have been fairly active small lot buyers, one interest closing for 500 tons of No. 2 plain. A fair amount of Virginia iron has been sold to New England consumers for fourth quarter at \$15, furnace, for No. 2 X. Rolling mill forge continues in fair demand, but is scarce, with \$16.75 nominally quoted. There has been little movement in basic iron; an Eastern buyer recently in the market for 3000 tons for Western shipment in the first four months of next year bought Valley basic. Eastern basic producers have little to offer for delivery the remainder of this year, but one maker is offering a small lot at \$16.75, furnace, equal to \$17.50 delivered. Moderate business continues to come out in low phosphorus iron, which, for standard analysis, is quoted firm at \$22, delivered, minimum. Additional merchant capacity would go in if producers were not confronted with scarcity and high prices of coke and unsatisfactory labor supply. Satisfactory ore supplies are hard to get except at materially higher prices. The following range of prices is quoted for standard brands, delivered in buyers' yards in this district, shipment over the remainder of the year; for more extended shipment advances of 25c. to 50c. a ton are named:

Eastern Pennsylvania No. 2 X foundry	\$17.25 to \$17.75
Eastern Pennsylvania No. 2 plain	17.00 to 17.50
Virginia No. 2 X foundry	17.80 to 18.00
Virginia No. 2 plain	17.55 to 17.75
Gray forge	16.75
Basic (nominal)	17.00
Standard low phosphorus	22.00

Ferroalloys.—Foreign makers of ferromanganese have generally withdrawn recent quotations for forward deliveries. In instances \$61, seaboard, is quoted, although some sellers have not yet announced new prices. Very little business is moving in this district, although scattered sales of prompt have been made at prices ranging around \$70, delivered. Little movement in ferrosilicon is noted; quotations for 50 per cent. are unchanged, although 10 to 12 per cent. furnace ferrosilicon has been advanced, now being quoted at \$26.30 to \$28.30, delivered in this district.

Billets.—A considerable volume of business in basic open hearth rolling billets for first quarter has been entered at \$28, delivered here. Rolling billets for delivery over the remainder of the year are extremely scarce. An active demand for forging billets is noted and fancy prices are obtained for early delivery; for ordinary forging billets \$32, f.o.b. Eastern mill, is the minimum quotation.

Plates.—Mills continue to receive a very satisfactory volume of business, buyers paying full prices for delivery over the remainder of the year. Producers, who have been quoting 1.55c. to 1.60c. for business on which satisfactory delivery dates are not available, are not seeking business aggressively. For January delivery plates have been reported sold at 1.75c., delivered in this vicinity. Eastern mills are quoting sheared plates at 1.65c. and universal plates at 1.70c. for October delivery in this district, with \$1 advance for November and \$2 advance for December delivery.

Structural Material.—Mills are well sold up for delivery over the remainder of the year, although occasional orders are taken, filling in rollings for early delivery. The bulk of the business has been in moderate lots, producers not being able to take care of large tonnages for this year. Quotations are very firm at 1.65c. for ordinary delivery, prompt shipments from mill stock commanding from 1.80c. to 1.85c., f.o.b. mill.

Sheets.—The demand has been more active, particularly for prompt deliveries, and Eastern mills able to make shipments readily obtain premiums of \$2 to \$3 a ton for early delivery. Considerable inquiry for forward shipments are noted, but few sellers will take business on which delivery extends beyond the year end. Eastern mills name 1.85c., delivered, for No. 10 blue annealed, and on lighter gauges readily obtain 1/2c. per pound advance for smooth, loose-rolled sheets.

Bars.—Prices of iron bars are steadily advancing under the continued good demand. Mills are running full capacity and in a number of instances obtain sharp advances for prompt shipments, in some cases as high as 1.60c., mill, being paid. For ordinary shipment 1.55c. to 1.60c., delivered in this vicinity, is quoted for iron bars. Steel bars continue active at 1.50c. to 1.55c., delivered here, but satisfactory shipments are hard to get.

Old Material.—While the market is decidedly stronger, there has been little movement in heavy melting steel, except between dealers, who are buying freely to cover contracts. Steel mills are buying only small lots available at \$14.50 to \$14.75, delivered. More activity is noted in rolling mill grades, transactions being usually at somewhat better prices. Wrought iron pipe has been sold at \$14, as has also No. 1 forge fire scrap. Somewhat more activity in car wheels is noted at higher prices. Machinery cast also shows an upward movement. While buying is not active, the market has a stronger tone. The following range of prices about represents the market for deliveries in buyers' yards, eastern Pennsylvania and nearby points, taking a freight rate ranging from 35c. to \$1.35 per gross ton:

No. 1 heavy melting steel scrap and crops	\$14.50 to \$15.00
Old steel rails, rerolling (nominal)	16.25 to 16.75
Low phosphorus heavy melting steel scrap	17.75 to 18.25
Old steel axles	18.50 to 19.00
Old iron axles	24.50 to 25.50
Old iron rails (nominal)	17.50 to 18.00
Old car axles	14.50 to 15.00
Old car wheels	14.50 to 15.00
No. 1 railroad wrought	16.50 to 17.00
Wrought iron pipe	13.50 to 14.00
No. 1 forge fire	13.50 to 14.00
No. 2 light iron (nominal)	8.00 to 8.50
Wrought turnings	11.50 to 12.00
Cast borings	10.75 to 11.25
Machinery cast	14.50 to 15.00
Grate bars, railroad	11.00 to 11.50
Stove plate	11.00 to 11.50
Railroad malleable (nominal)	13.00 to 13.50

Coke.—A sharp advance has occurred in prices of both foundry and furnace coke. Sales have been made at prices ranging from \$3 to \$3.25 at oven for forward shipment, while \$3.50 has been paid for prompt.

Prompt furnace coke has been sold in moderate lots at prices ranging between \$3.25 and \$3.50. Contract furnace coke for 1913 delivery is now quoted close to \$3. For delivery in this district the following range of prices, per net ton, about represents the market:

Connellsville furnace coke	\$5.15 to \$5.40
Connellsville foundry coke	5.15 to 5.65
Mountain furnace coke	4.75 to 5.00
Mountain foundry coke	4.75 to 5.25

Cleveland

CLEVELAND, OHIO, October 8, 1912.

Iron Ore.—A number of consumers have not yet secured all the ore they expect to need and several inquiries are pending for lots up to 25,000 tons, mostly of ore for basic iron. Lake shipments in September again passed the 7,000,000 ton mark, making a new record for the month. The total Lake movement for September was 7,287,230 gross tons, which was only 473,000 tons less than the August shipments. The movement up to October 1 was 36,338,382 tons, or 1,237,518 tons greater than during the corresponding period of 1910 when the shipment for the year reached 42,600,000 tons. While the shipment of the Steel Corporation will show some falling off in October, shipments by independent producers will be very heavy in this month and November. The grain movement has fallen off somewhat, so that at present there is not a scarcity of boats for the handling of ore. An agreement has been reached between shippers and the Ohio tax officials that one-sixth of the ore on Lake Erie docks on April 1 last shall be taxed at a valuation of \$2.40 a ton, the remainder of the 6,000,000 tons on the docks at that date being regarded as in transit. The ore companies also consented to pay taxes on 1,000,000 tons of ore on docks April 1, 1911, at a \$2.40 valuation. We quote prices as follows: Old range Bessemer, \$3.75; Mesaba Bessemer, \$3.50; old range non-Bessemer, \$3.05; Mesaba non-Bessemer, \$2.85.

Pig Iron.—The demand for foundry grades is not so active as during the previous few weeks, but the market is very firm, and a further advance in prices is being asked. Cleveland furnaces have advanced minimum quotations 25c. a ton and are now quoting No. 2 foundry at \$16.25 to \$16.75, at furnace. Sales at the former price have been made for both local delivery and out of town shipments. A leading Valley interest has advanced its quotation on No. 2 foundry to \$16.50, at furnace. Several sales are reported in lots ranging from 200 to 1000 tons and a number of small inquiries are pending. A leading sanitary interest has bought a round tonnage of Northern iron for its Pittsburgh plant and from 3000 to 4000 tons of Southern iron for its Louisville plant for next year's delivery. Basic makers appear to be holding firmly to their recent quotation of \$16. A Cleveland interest came into the market in the week for 10,000 tons of basic for delivery at Sharon, Pa., in the first quarter and is reported to have purchased a portion of that tonnage at \$16. Other basic inquiries include one from Pittsburgh for 4500 tons for the last quarter and first quarter and one from Canton, Ohio, for spot shipment. Southern iron is firm at a minimum quotation of \$13.50, Birmingham. Southern Ohio makers have advanced prices on silvery iron to \$18 for 8 per cent. silicon and one producer is asking a further advance of \$1 a ton for the first half. For prompt shipment and for the first half we quote, delivered Cleveland, as follows:

Bessemer	\$17.40 to \$17.65
Basic	16.65 to 16.90
Northern No. 2 foundry	16.50 to 16.75
Southern No. 2 foundry	17.85 to 18.35
Gray forge	16.00 to 16.25
Jackson County silvery, 8 per cent. silicon	19.55

Coke.—Prices have advanced and the market is very firm, but not many sales are reported. Sellers are asking as high as \$3 for standard Connellsville furnace coke on contract and \$3.25 for spot shipment. There is some inquiry for furnace coke for November and December delivery, but makers are not inclined to quote prices, preferring to hold their output with the expectation of getting better spot prices. Standard 72-hr. foundry coke is held at \$3.25 and \$3.50 per net ton at oven for spot shipment and contract.

Finished Iron and Steel.—Prices have stiffened up. Nearly all the mills are now quoting steel bars at 1.40c., Pittsburgh, and for plates and structural material 1.45c. now appears to be the minimum quotation. Prices on iron bars have been advanced to from 1.55c. to 1.65c. at mill. There is no falling off in the heavy demand on contracts and there is considerable inquiry for next year's delivery. Some mills that are filled up for the

first quarter are taking business for the second quarter, but in many cases mills are making contracts for only half the tonnage asked for. The readjustment necessitated by the change from practically prompt shipment to deliveries three or more months ahead has gradually been effected, so that conditions are more satisfactory than a month or two ago. The Eastern Steel Company has advanced its quotation on shapes for western shipment \$2 a ton and is now quoting 1.55c. at mill for early delivery. The American Bridge Company has taken 16,000 to 17,000 tons of structural material for the new steel plant of Corrigan, McKinney & Co., Cleveland. The King Bridge Company, Cleveland, was the low bidder on steel required for the Superior avenue viaduct in Cleveland. This company bid \$152.50 a ton on specifications requiring both nickel and plain steel and \$130.70 a ton for carbon steel alone. The amount required will be 3750 tons in the case of nickel-carbon steel and 4375 tons of plain steel. An Eastern company which has been selling forging billets in this market, is now sold up for the remainder of the year and is quoting forging billets at \$33 at mill or \$34.65, Pittsburgh, for the first quarter. Sheets are very firm at regular prices at which some contracts are being placed for the first quarter. A local maker has advanced rivet prices \$1 a ton to 1.95c. for structural and 2.05c. for boiler for car lots for the remainder of the year. For the first half an advance of \$3 over these prices is being quoted.

Old Material.—There is considerable inquiry for all kinds of scrap and prices on most grades have been advanced about 50c. a ton. Little or no heavy steel scrap is being offered by local dealers as low as \$14. Railroad lists that closed last week brought good prices. Much of the heavy steel scrap is understood to have been taken by Valley mills at prices better than \$15. Local dealers are holding for higher prices and sales have not been large. We quote, delivered Cleveland, as follows:

Per Gross Ton.

Old steel rails, rerolling.....	\$15.00 to \$15.50
Old iron rails	15.50 to 16.00
Steel car axles	18.75 to 19.25
Heavy melting steel	13.75 to 14.25
Old car wheels	13.50 to 14.00
Relaying rails, 50 lb. and over.....	22.00 to 22.50
Agricultural malleable	11.50 to 12.00
Railroad malleable	13.50 to 13.75
Light bundled sheet scrap	10.00 to 10.50

Per Net Ton.

Iron car axles	\$20.50 to \$21.50
Cast borings	8.00 to 8.25
Iron and steel turnings and drillings	8.50 to 8.75
Steel axle turnings	9.00 to 9.25
No. 1 busheling	12.00 to 12.50
No. 1 railroad wrought	13.50 to 14.00
No. 1 cast	12.50 to 13.00
Stove plate	10.00 to 10.50
Bundle tin scrap	11.00 to 11.50

Cincinnati

CINCINNATI, OHIO, October 9, 1912.—(By Telegraph.)

Pig Iron.—Prices continue to advance steadily, both South and North, but in the Hanging Rock district there is some resale iron that is holding the prompt shipment quotation down to \$15.50, Ironton, although the furnace interests are firm at \$16 for any shipment this year and a few have advanced to \$16.50 for first quarter. In the South \$14, Birmingham, appears to be firmly established for No. 2, as far as the majority of furnaces are concerned, but \$13.50 for the last quarter is still being done. One producer accepting orders on this basis has issued instructions to selling agencies to submit all business before final acceptance. Experienced iron merchants who have been following the situation closely predict much higher prices for both Southern and Northern iron before the close of the year. Inquiries are scarce, but considerable business is being booked through salesmen for first quarter shipment and some for delivery through the first half; however, the larger percentage of furnaces are very reluctant about putting out any prices for shipment beyond March. Basic iron is even scarcer for nearby delivery than foundry grades, and it is rumored that a Central Western manufacturer was compelled to purchase in another market to fill his requirements for the forepart of next year. About 4000 tons of Southern No. 3 foundry was taken by a buyer in the Middle West for first quarter shipment, and a Michigan company booked 1300 tons of Lake Superior charcoal iron for first half. It is rumored that a sale of 500 tons of Bessemer 10 per cent. ferrosilicon was made last week in the Pittsburgh district below the newly established

quotation of \$23 at furnace, which is \$3 higher than the minimum price at this time last week. A central Ohio consumer is expected to close for 500 tons of malleable for first quarter, and there is a nearby inquiry for the same tonnage of Northern foundry. The high silvery irons have taken on a sharp advance that may temporarily check buying. Based on freight rates of \$3.25 from Birmingham and \$1.20 from Ironton we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 foundry and 1 soft....	\$17.00 to \$17.50
Southern coke, No. 2 foundry and 2 soft....	16.75 to 17.25
Southern coke, No. 3 foundry.....	16.50 to 17.00
Southern coke, No. 4 foundry.....	16.25 to 16.75
Southern gray forge	16.00 to 16.50
Ohio silvery, 8 per cent. silicon.....	19.20 to 19.70
Southern Ohio coke, No. 1.....	17.20 to 17.70
Southern Ohio coke, No. 2.....	16.70 to 17.20
Southern Ohio coke, No. 3.....	16.45 to 16.95
Southern Ohio malleable Bessemer.....	16.20 to 16.70
Basic, Northern	16.70 to 17.20
Lake Superior charcoal	19.25 to 19.75
Standard Southern car wheel	25.75 to 26.25

(By Mail)

Coke.—Wise County operators, in the past 10 days, have booked orders from Southern furnace interests for approximately 80,000 tons of 48-hr. coke, to be shipped next year. The bulk of this is understood to have been taken around \$2.50 per net ton at oven; and while a small quantity might still be available at this figure, the majority of producers are asking from \$2.60 to \$2.80. For spot shipment it is hard to get either furnace or foundry grades, as it is a difficult task for oven operators to take care of contracts on hand. In the Connellsville district it is almost impossible to obtain correct quotations. A few interests are unwilling to take less than \$2.90 for furnace coke, and there are quotations out as high as \$3 for nearby shipment, but a desirable long time contract at \$2.75 per net ton at oven would not be turned down by a number of producers. Although Pocahontas coke is not keeping pace with prices in the other two districts by about 10c. a ton, the car shortage in that particular territory has caused operators to assume a very indifferent attitude, and as long as the heavy demand for coal continues this situation is not likely to be changed. Foundry coke is in better demand, but there is considerable complaint over delayed shipments. Connellsville standard foundry grades are quoted around \$3 to \$3.25 per net ton at oven, and about 10c a ton less for Wise County and Pocahontas brands. A few spot shipment sales of Connellsville 72-hr. coke have been made as high as \$3.40.

Finished Material.—Recent advances in prices have not had any tendency to slacken the demand for almost all kinds of finished products. The trouble with the mills now is in the matter of deliveries, and this is especially true on steel bars and structural shapes. Mill agencies have instructions to submit all orders before acceptance, and it is reported that it is impossible for the mills to take care of old customers who are sending in specifications on contracts previously made. Prices are very firm. We quote steel bars at 1.35c. to 1.40c. and structural material around 1.45c. to 1.50c. Pittsburgh basis, but only a desirable order would be booked at the first named figures. Wire nails show considerable improvement. Tin plate is strong at \$3.60, based on 14 x 20 in. for coke plates, Pittsburgh. The local warehouses report a steady call for all kinds of finished material.

Old Material.—Although we are not changing our quotations this week, the market is very strong, and prices on all grades are expected to advance soon in sympathy with pig iron. The foundry demand is excellent, and that from the rolling mills is better than for over two years. The minimum figures given below represent what buyers are willing to pay for delivery in their yards, southern Ohio and Cincinnati, and the maximum quotations are dealers' prices f.o.b. at yards:

Per Gross Ton.

Bundled sheet scrap	\$10.50 to \$11.00
Old iron rails	14.25 to 14.75
Relaying rails, 50 lb. and up.....	21.75 to 22.75
Rerolling steel rails	12.25 to 12.75
Melting steel rails	11.50 to 12.00
Old car wheels	13.00 to 13.50

Per Net Ton.

No. 1 railroad wrought	\$11.75 to \$12.25
Cast borings	7.25 to 7.75
Steel turnings	8.00 to 8.50
No. 1 cast scrap	11.00 to 11.50
Burnt scrap	7.75 to 8.25
Old iron axles	18.25 to 18.75
Locomotive tires (smooth inside).....	12.00 to 12.50
Pipes and flues	7.75 to 8.25
Malleable scrap	9.50 to 10.00
Railroad tank and sheet scrap	7.25 to 7.75

Boston

BOSTON, MASS., October 8, 1912.

Old Material.—The market is strong, with slight price advances. The mills are buying freely where they can get present prices, but are not placing much business at an advance. Conditions are somewhat influenced by a tendency to speculate. The quotations given below are of prices offered by the large dealers to the producers and to the small dealers and collectors, per gross ton, carload lots, f.o.b. Boston and other New England points, taking Boston rates from eastern Pennsylvania points. In comparison with Philadelphia prices the differential for freight of \$2.30 a ton is included. Mill prices are approximately 50c. a ton more than dealers' prices:

Heavy melting steel	\$11.75 to \$12.25
Low phosphorus steel	13.50 to 14.00
Old steel axles	14.50 to 15.00
Old iron axles	22.00 to 22.50
Mixed shafting	14.00 to 14.50
No. 1 wrought and soft steel	11.50 to 11.75
Skeleton (bundled)	10.00 to 10.50
Wrought iron pipe	10.00 to 10.25
Cotton ties (bundled)	10.75 to 11.00
No. 2 light	4.50 to 5.00
Wrought turnings	8.00 to 8.50
Cast borings	7.75 to 8.25
Machinery, cast	12.50 to 13.00
Malleable	10.00 to 10.50
Grate bars	7.75 to 8.00
Stove plate	8.50 to 9.00
Cast-iron car wheels	12.50 to 13.00

Birmingham

BIRMINGHAM, ALA., October 7, 1912.

Pig Iron.—Southern manufacturers of pig iron are not anxious as yet to sell into the second quarter of the coming year. For delivery in the last quarter of this year and the first three months of 1913 the quotations for pig iron have taken on additional strength, and \$14 is being asked for No. 2 foundry. There is no further iron to be had, for immediate delivery or otherwise, at \$13.50. While inquiries are being received, as far as can be learned there has been no extensive business attempted even for the first half of the coming year. The pig iron production in the South will have to be increased to meet the demand, the accumulated stock of iron dwindling rapidly. The belief is expressed that if manufacturers would be willing to sell for delivery in the second quarter of the coming year at \$15 there would be some consumers who would be willing to trade. The sales in the month of September were equal to those of August, having been above 150,000 tons. One of the larger companies in this district is out of the market for delivery in the last quarter, but is still accepting business for the first three months of the coming year. Another interest is handling business right along, but is very careful as to the grades of iron being sold. It is understood that this company has some large sales booked on lower grades of iron and a little apprehension prevails that too large promises might be made. Much trouble is being experienced in getting cars with which to deliver pig iron and kindred products. Crops are beginning to move and there is an activity in other lines that requires a large amount of equipment. Two blast furnaces to run on foundry iron are scheduled for blowing in this month, while one charcoal iron furnace may be making iron by the end of this month or early in November. Charcoal iron still commands \$22 and \$22.50 and there is a fairly good consumption; in fact, the accumulation of this kind of iron is not of much concern. There appears to be a friendly spirit among the iron manufacturers in the Southern territory, as more than once recently one furnace company has come to the assistance of another and furnished some pig iron to meet the demand promptly. Quotations, f.o.b. Birmingham, are as follows:

No. 1 foundry and No. 1 soft	\$14.00 to \$14.50
No. 2 foundry and No. 2 soft	14.00
No. 3 foundry	13.25 to 13.50
No. 4 foundry	12.50 to 13.00
Gray forge	12.00 to 12.25

Cast Iron Pipe.—Shipments from local foundries are only measured by the ability to get transportation facilities. The strengthening of prices a few weeks ago has had no disturbing effect on the general market. The product is being needed in all directions and production is at the top notch. That the melt this year at the cast-iron pipe plants will be the greatest ever yet attained is not doubted in the least. Prices are on the basis of \$25 for 4-in., per net ton. Soil pipe is also enjoying a healthy demand at satisfactory prices.

Coal and Coke.—Coal production in Alabama is heavy, the only disturbing element being the car short-

age. The output in Alabama the present year would show a decided increase over what it was two years ago if the railroads were able to handle the coal mined. Orders are in hand for a very large tonnage. Coke is in good demand, with slight reductions made in prices recently. An accumulation is being sought in both coal and coke by some of the larger iron and steel companies for fear that weather conditions may interfere with operations later on.

Old Material.—Good prices obtain for old material. Old steel material, especially rails, is in demand, with plenty of stock on hand to supply it. Prices are as follows, per gross ton:

Old iron car axles	\$15.50 to \$16.00
Old steel axles	14.00 to 14.50
Old iron rails	14.00
No. 1 railroad wrought	11.00 to 11.50
No. 2 railroad wrought	10.00
No. 1 country wrought	9.00 to 9.50
No. 2 country wrought	8.50 to 9.00
No. 1 machinery	9.00 to 9.50
No. 1 heavy melting steel	9.50 to 10.00
Tram car wheels	10.00 to 10.50
Light cast and stove plate	7.50 to 8.00
Standard car wheels	10.50 to 11.00

St. Louis

ST. LOUIS, Mo., October 7, 1912.

Pig Iron.—The chief purchase in pig iron of the week was the taking of 10,000 tons for first quarter and some first half delivery by the Commonwealth Steel Company, whose inquiry was noted last week. This was Northern iron and went at prevailing quotations. The largest inquiry out during the week was for 1000 tons of No. 2 Southern, but there were large numbers of inquiries for and purchases of smaller lots. The feature of these has been prompt closing, few being out more than two or three days.

Coke.—Very few buyers appear to be willing to accept shipment in rack or open cars, insisting on box cars, though all classes of rolling stock are short. The quotations here at present are \$3 for best selected 72-hr. Virginia coke, while as high a quotation as \$3.30 for best 72-hr. selected Connellsville has been withdrawn. The quotation for by-product coke is unchanged, but there is very little doing in this.

Old Material.—The scrap market is exceedingly active with all prices well maintained and many of them increased. Steel and rolling mills and foundries are all active purchasers and dealers are very optimistic as to the future demand and prices. Relaying rails, both light and heavy, continue in sharp demand and are very hard to get. Lists out during the week to close during the present week are the Missouri Pacific, 1700 tons; Vandalia, 250 tons; Chicago & Alton, 300 tons; Kansas City Southern, 300 tons. The Frisco list of 700 tons last week closed at higher prices than previously. We quote dealers' prices, f.o.b. St. Louis, as follows:

Per Gross Ton.

Old iron rails	\$16.50 to \$17.00
Old steel rails, re-rolling	13.75 to 14.25
Old steel rails, less than 3 ft.	14.50 to 15.00
Relaying rails, standard section, subject to inspection	23.50 to 24.00
Old car wheels	15.50 to 16.00
Heavy melting steel scrap	14.00 to 14.50
Frogs, switches and guards cut apart	14.00 to 14.50

Per Net Ton.

Iron fish plates	\$13.00 to \$13.50
Iron car axles	19.50 to 20.00
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	13.00 to 13.50
No. 2 railroad wrought	12.00 to 12.50
Railway springs	12.00 to 12.50
Locomotive tires, smooth	13.50 to 14.00
No. 1 dealers' forge	9.00 to 9.50
Mixed borings	8.00 to 8.50
No. 1 busheling	11.00 to 11.50
No. 1 boilers cut to sheets and rings	8.50 to 9.00
No. 1 cast scrap	12.50 to 13.00
Stove plate and light cast scrap	9.00 to 9.50
Railroad malleable	11.50 to 12.00
Agricultural malleable	10.50 to 11.00
Pipes and flues	9.00 to 9.50
Railroad sheet and tank scrap	9.00 to 9.50
Railroad grate bars	9.25 to 9.75
Machine shop turnings	9.00 to 9.50

Finished Iron and Steel.—Heavy purchases continue, the demand being general both as to material and the directions from which the request comes. Urgent appeals for early shipment continue. In standard rails the Wabash closed for 20,000 tons for 1913 delivery. Part of the Frisco tonnage previously purchased has been ordered carried over to 1913, but not a very large amount has been thus affected. Track

fastenings are stiffer, being quoted at \$1.95, St. Louis, for spikes and \$2.35 for bolts. Light rails are continuing in heavy demand. Plate deliveries are five months behind to this section. The agricultural and wagon interests are busy and are pushing hard for material contracted for. Car inquiries which come out here were for 4500 for the Northern Pacific and 100 for the Missouri & North Arkansas.

Buffalo

BUFFALO, N. Y., October 8, 1912.

Pig Iron.—As foreshadowed a few weeks ago it is now becoming known that quite a large tonnage of furnace capacity in this vicinity is being devoted to the production of basic with a withdrawal of an equivalent measure of production from the foundry trade in consequence. This withdrawal of foundry iron blast-furnace capacity happening to coincide with a very sharp increase in consumption by foundries, both large and small, has operated to bring about a great change in the foundry iron market. Furnaces in this district are finding it almost impossible to meet the demand, being sold up to such an extent that they are unable to accommodate consumers in the full percentage of their offerings and in many instances are obliged to refuse to quote on large tonnage inquiries and for the smaller inquiries are only making tenders on a minimum portion of the quantity inquired for. Malleable pig iron is very scarce and almost unobtainable, the exceedingly heavy demand for this commodity now in evidence not having been anticipated by producers. Consequently provision for necessary ores was not made at furnace. The Susquehanna furnaces of the Rogers-Brown Iron Company have sold a heavy tonnage of molten basic, which it is stated will aggregate about 30,000 tons, to the Lackawanna Steel Company. The plants adjoin each other, permitting the easy transfer of the metal in a molten state. Prices of all grades have again been advanced 25c. to 50c. per ton, as per schedule quoted below, f.o.b. Buffalo, for first half delivery, practically no iron being obtainable for delivery during the remainder of the year:

No. 1 foundry	\$17.00 to \$17.50
No. 2 X foundry	16.50 to 17.00
No. 2 plain	16.25 to 16.50
No. 3 foundry	16.00
Gray forge	16.00
Malleable	16.50 to 17.00
Basic	17.00 to 17.25
Charcoal, regular brands and analysis	18.75 to 21.25
Charcoal, special brands and analysis	22.00

Finished Iron and Steel.—The market is clearly in the seller's favor in all respects and discrimination is being shown in the obligations incurred by the mills. There is an increased tendency to enforce the equal monthly quota clause of contracts, formerly a dead letter when mill conditions were slack. Unspecified portions of monthly allotments are written off promptly. Practically all of the selling agencies, including that of the leading interest, have announced the withdrawal of the 1.35c., Pittsburgh, base price on bars and small shapes and 1.45c. on structural material and plates and are now putting a minimum of 1.40c. on bars and small shapes and 1.50c. on structural material and plates for first quarter delivery. Quotations are being rigidly held to the advanced schedules. One independent interest which is able to make reasonably prompt deliveries in small lots is obtaining even higher prices. Warehouse prices are running \$10 to \$15 per ton above mill quotations. The demand for black and galvanized sheets is very strong and prices are at the point of a further increase. Bids are soon to be called for on plans for the Masten Park High School, Buffalo, taking 1400 tons of steel, and on revised plans for the Hutchinson High School, Buffalo, about 1200 tons; also for a warehouse addition to the Husted Milling Company's plant, Buffalo, 200 tons and for the Borden Condensed Milk Company's new plant at Sinclairville, N. Y., requiring a considerable tonnage. Figures are also being taken by Architects Colson & Hudson for the Allen E. Klopp building, Main street, Buffalo, requiring a small tonnage. The Lackawanna Bridge Company, Buffalo, will build the machine shop extension of the Pennsylvania General Electric Company, Erie, Pa., about 750 tons, and for a new shop for the Buffalo Bolt Company at North Tonawanda, N. Y., 100 tons. The Lackawanna Bridge Company was low bidder for the steel for the punch shop of the Phoenix Horse Shoe Company, Poughkeepsie, N. Y.

Old Material.—The market is very strong with indications of increasing activity both as regards local foundry and mill consumption and demand from out-

side territory. Transactions of considerable tonnage are reported in most lines, with railroad wrought, heavy melting steel and malleable in the lead. Prices are stiffly held by dealers with advances in a number of commodities. We quote as follows per gross ton, f.o.b. Buffalo:

Heavy melting steel	\$14.50 to \$14.75
Low phosphorus steel	17.00 to 17.50
No. 1 railroad wrought	15.50 to 16.00
No. 1 railroad and machinery cast scrap	14.00 to 14.50
Old steel axles	16.00 to 16.75
Old iron axles	23.25 to 23.75
Old car wheels	14.75 to 15.25
Railroad malleable	13.75 to 14.00
Boiler plate sheared	15.00 to 15.50
Locomotive grate bars	11.75 to 12.25
Wrought pipe	10.25 to 10.75
Tank iron	10.50 to 11.00
Wrought iron and soft steel turnings	8.75 to 9.00
Clean cast borings	8.00 to 8.50

German Advices Continue Favorable

BERLIN, September 26, 1912.

Quite a number of advances have taken place. On the Duesseldorf Exchange last Friday English No. 3 foundry iron was quoted, delivered at Ruhrort, at 85 to 88 marks, against 80 to 82 marks previously; English hematite at 94 to 97 marks, against 92 to 94 marks, and ordinary basic steel bars at 123 to 126 marks, against 122 to 126 marks. At a recent meeting of bar iron makers it was voted to raise bars 5 marks, to take effect at once; the market position was pronounced satisfactory to an extraordinary degree and a further advance was declared probable. The West German Cartel of iron dealers has circularized its members asking them to vote for another increase of 5 marks on bars, plates and bands, to take effect October 1. Some of the subordinate organizations have already so voted. The association controlling commercial screws has decided to reduce rebates, equivalent to an advance of 2 to 5 per cent. on different grades, and the rebate on nuts has been reduced 5 to 10 per cent. The Eastern and Saxon group has just added 15 and 20 marks a ton on plain and enameled cast goods.

The Steel Syndicate Optimistic

At the monthly meeting of the Steel Works Union held today an optimistic resumé of the market position was given out. It states that business in semi-manufactured products for home account continues very lively. Calls for delivery of material are so urgent that in many cases they cannot be met. Foreign consumers are sending in specifications very briskly; orders in hand for heavy rails are considerably greater than at this time last year; the Prussian State railroads have been sending in supplemental orders, with the result that their total takings of rails and ties for 1912 are 75,000 tons greater than for last year, and of other products 11,000 tons greater; home business in structural shapes has developed satisfactorily, and specifications are arriving in good volume, considering the advanced season; the foreign trade in structural shapes has continued to expand, and at rising prices; the export bookings about the beginning of September were considerably above those of a year ago.

Foreign Bar Buyers Have a Long Wait

In the Luxemburg-Lorraine district most works are either only selling small lots of bars or are refusing to sell at all at present prices, although these prices are 2 to 2.50 marks better than previously reported. Long periods of delivery for bars are stipulated; manufacturers are favoring home buyers, so that foreign contracts are only filled within 23 to 26 weeks after specifications are received. The pig iron business of the region has developed rapidly this year. The August production was almost 19 per cent. greater than for August, 1911. The local pig iron producers are much pleased with the proposal of the Prussian Minister of Railways to reduce freights on coal, coke and ores between that region and the Rhenish-Westphalian district.

August shipments of the ship-plate combination amounted to 20,000 tons, or 5000 tons more than in July. New orders reached 24,000 tons, against only 6000 tons in July. Heavy work in ship plates will evidently continue for a long time, as about a dozen big steamers have been ordered by German shipping companies this month.

Germany's total exports of iron and steel in August were 466,141 tons. This was about 20,000 tons more than in August, 1911, but it was smaller than for any previous month of the year.

Belgium continues to send in reports of rising prices, and detailed market reviews of the Belgian situation appearing in the German press represent con-

ditions as highly satisfactory. Foreign buying has grown more active of late. Some of the mills are stipulating delivery dates on bar orders as far ahead as into the second quarter of 1913. A Prague dispatch of yesterday says that the Austro-Hungarian Sheet Cartel has just advanced the price of black sheets 5 crowns a ton.

New York

NEW YORK, October 9, 1912.

Fig Iron.—One large New Jersey foundry interest producing furnace castings has bought 5000 tons of iron for delivery in the first half of 1913. It is also reported that most of the large inquiry of a radiator interest, with foundries in Pennsylvania and Connecticut, has been covered. This company wanted from 3000 to 6000 tons of No. 2 X iron and 2000 to 4000 tons of 4 to 5 per cent. silicon iron. It is believed that the amount taken or about to be closed is more than the total of the maximum tonnages mentioned. At the moment no inquiries of large size are before the trade. The Buffalo interests represented in this market are well sold for the first quarter of 1913, and some of them have booked nearly all they can ship in the first half. One recent sale in the Buffalo district was of a considerable tonnage of liquid basic metal, to be delivered to a nearby steel works. Buffalo furnaces differ in their prices. One interest which has been selling at \$16.25 to \$16.75 at furnace is now asking \$16.50 for 2 per cent. to 2.5 per cent. silicon iron, and \$16.75 for 2.5 to 3 per cent. silicon iron, delivery in the first quarter or half of 1913. Some sales of Buffalo iron have been made, however, at \$17 at furnace for No. 2 X for delivery this year. Some further Canadian inquiry for Buffalo iron is reported. Evidently foundry operations are on a somewhat larger scale, a number of requests coming up to furnace companies for the anticipation of deliveries. As a rule, however, it is the larger buyers that have bought for the first three to six months in next year, the small and moderate sized foundries having been content to cover as a rule for one or two months in the new year. Eastern Pennsylvania furnaces that have been quoting \$16.50 at furnace are now asking \$16.75, and one or two producers are quoting \$17 at furnace for iron to be delivered in the first half of next year. We quote as follows for Northern iron at tidewater: No. 1 foundry, \$17.25 to \$17.50; No. 2 X, \$17 to \$17.25; No. 2 plain, \$16.75 to \$17. Southern iron is quoted at \$17.50 to \$17.75 for No. 1 foundry and \$17.25 to \$17.50 for No. 2.

Structural Material.—The minimum for plain structural material is now 1.45c., Pittsburgh. Some Eastern mills are at 1.50c., Pittsburgh, with deliveries at 8 to 12 weeks. The strength of the market is such that one large consumer, for example, has been instructed that finished material protected by option will cost \$2 a ton more if not specified within the next 10 days. This is thought to indicate that the large buyer will be brought either on a strict level or closer to the level of the general market. Fabricators report considerable activity in building projects, but the situation with the railroads has not changed. Competition for the building work is narrowed somewhat, owing to the urgency of some of the work, and on this account the slowness of settling some of the large building movements is viewed with favor by fabricators having much work already booked, or who have to wait two or three months to get the plain material. Not much large work has been closed, this including 400 tons for a power house for the Delaware & Hudson at Olyphant, Pa., to the Eastern Steel Company, and 300 tons for the Erie awarded to the American Bridge Company. One new large project requiring 4000 tons has taken definite shape, being the New York Cotton Exchange, Marc Eidlitz & Son, general contractors. The activity in the building line is in both loft buildings and apartment houses. A lofty garage on West Forty-fourth street requiring 1000 to 1200 tons is being figured. We quote plain material at 1.61c. to 1.66c., New York, mill shipments, and 2.15c. from store.

Plates and Bars.—In line with the advances in plain structural material, the minimum on plates and steel bars has been raised to more nearly the average figures actually ruling. Prompt business in plates continues to be done at \$2 and \$3 a ton higher than the minimum. The prices are, after all, largely for first and second quarter of 1913, large consumers in the meantime being well covered. Some car business add-

ing to the consumption of plates, shapes and bars has been placed, but there is still about 15,000 cars in active inquiry. The center sill construction for 1000 Baltimore & Ohio cars has been given half to the Pressed Steel Car Company and half to the Ralston Steel Car Company; the Haskell & Barker Car Company is to build 500 flat cars for the Chicago, Burlington & Quincy; the Pullman Company has taken a contract for five dining cars for the Missouri, Kansas & Texas and the Lehigh & New England has awarded 500 box cars, half to the American Car & Foundry Company and half to the Standard Steel Car Company; the Pressed Steel Car Company is to build 25 motor car bodies for the New York Central. Among new car business may be mentioned 100 box and 200 gondola cars for the Denver Northwestern & Pacific; 100 box cars for the Missouri & North Arkansas, and center sill construction for the Buffalo, Rochester & Pittsburgh and the Pittsburgh, Shawmut & Northern. Demand still continues heavy for bar iron and bar iron products. We quote sheared plates at 1.61c. to 1.66c., New York, and universal plates at 1.66c. to 1.71c. Steel bars, 1.56c. to 1.61c., New York, mill shipments, and from store 2c.; iron bars, 1.50c. to 1.55c., New York, and from store, 1.90c.

Ferroalloys.—The continued declination of some English producers to quote prices on 80 per cent. ferromanganese for American shipment has led to a further advance for the alloy, and \$61, Baltimore, is now the bottom price quoted for next year's delivery. There is a scarcity of ferromanganese of all positions, although a large tonnage is going into consumption against old contracts. There is every prospect for heavy placement for next year, but buyers are running close in the hope of getting better terms and consequently present inquiry is light. Ferromanganese for spot or early delivery is quoted from \$65 to \$71, depending on quantity and seller. For 50 per cent. ferrosilicon, the price remains at \$75, Pittsburgh, for carloads, \$74 for 100 tons and \$73 for 600 tons and up. Ferrosilicon also is reported scarce, but at the same time consumers are not eager to buy as their immediate needs are covered.

Cast Iron Pipe.—The United States Cast Iron Pipe & Foundry Company was awarded the contract for 850 tons, placed by Jamestown, N. Y., October 4, at \$22.90 per net ton, delivered. This pipe will probably be made at the company's Buffalo plant. The demand for pipe for early delivery keeps up remarkably well, considering the lateness of the season. It is still running mainly to small sizes. A stronger tendency is observed among consumers to place contracts for next year, but so far buyers and sellers are somewhat apart as to prices. Carload lots of 6 in. are quoted at \$24.50 to \$26 per net ton, tidewater, according to the condition of order books.

Old Material.—The market is strong, but conditions in the East have not yet reached the same degree of activity as reported in the Pittsburgh district. Large consumers of steel scrap in eastern Pennsylvania are apparently well stocked for the present, and some of them have lately been receiving shipments a little too rapidly as they are requesting dealers to slow up. It is remarkable that, although reports are current of dealers paying advanced prices to cover their short contracts, a sale of steel scrap was made the past week at \$14.25, delivered in eastern Pennsylvania. From present appearances prices in eastern Pennsylvania will have to be advanced or the Pittsburgh district will absorb much of the available supply of steel scrap on the seaboard. Old car wheels and cast scrap are strong. Sales of old car wheels have been made to consumers at points in western Pennsylvania and to Canada. Canadian sales have netted \$20.50, Montreal, duty paid. Dealers' quotations, per gross ton, New York and vicinity, are as follows:

Old girder and T rails for melting.....	\$12.00 to \$12.50
Heavy melting steel scrap	12.00 to 12.50
Relaying rails	22.00 to 22.50
Rerolling rails	14.00 to 14.50
Iron car axles	22.50 to 23.00
Old steel car axles	16.50 to 17.00
No. 1 railroad wrought	14.00 to 14.50
Wrought iron track scrap	13.25 to 13.75
No. 1 yard wrought, long	12.50 to 13.00
No. 1 yard wrought, short	12.00 to 12.50
Light iron	5.25 to 5.50
Cast borings	8.00 to 8.50
Wrought turnings	9.25 to 9.75
Wrought pipe	11.50 to 12.00
Old car wheels	14.00 to 14.50
No. 1 heavy cast, broken up.....	13.00 to 13.50
Store plate	10.25 to 10.75
Locomotive grate bars	10.00 to 10.50
Malleable cast	10.75 to 11.25

Higher Prices in the British Market

Pig Iron Recovers; Semi-Finished Material
Stronger — Italy After Southern Iron
(By Cable.)

MIDDLESBROUGH, ENGLAND, October 9, 1912.

Ferromanganese is now quoted at £11 12s. 3d., f.o.b., Liverpool, against a minimum of £11 5s. last week. The quarterly meeting of the ironmasters at Birmingham, scheduled for October 10, is expected to give a fresh lead to conditions.

Italy is asking for a big lot of American Southern pig iron. Semi-finished material is in excellent demand at hardening prices. The United States Steel Corporation is asking £6 for sheet bars, c.i.f. We quote as follows:

Cleveland pig iron warrants (closing Tuesday), 66s. 8d., against 66s. 7d. one week ago.

No. 3 Cleveland pig iron, maker's price, f.o.b. Middlesbrough, 67s. 6d., a recovery of 3d. to the price of two weeks ago.

Steel sheet bars (Welsh) delivered at works in Swansea Valley, £5 17s. 6d. for January-March delivery.

German sheet bars, f.o.b., Antwerp, 110s.

German 2-in. billets, f.o.b., Antwerp, 105s., an advance of 1s.

German basic steel bars, f.o.b. Antwerp, £6 4s.

Steel bars, export, f.o.b. Clyde, £7 15s. to £7 17s. 6d.

Steel joists, 15-in., export, f.o.b. Hull or Grimsby, £7 5s. nominal.

German joists, f.o.b. Antwerp, £5 12s. to £5 15s.

Steel ship plates, Scotch, delivered local yard, £8 2s. 6d.

Steel black sheets, No. 28, export, f.o.b. Liverpool, £9 15s.

Steel rails, export, f.o.b. works port, £6 15s., an advance of 2½s. from last week.

Tin plates, cokes, 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 15s. 6d., an advance of 1½d. from last week.

The Reaction in Pig Iron—Deliveries of American Steel Postponed

(By Mail)

MIDDLESBROUGH, ENGLAND, September 28, 1912.

Some pig iron interests have been very skeptical about the rate of the upward movement, and their views have been borne out by the reaction following an excited speculation. There has been a good deal of irresponsible talk, one tale being that Philadelphia interests have got 50,000 tons of Cleveland warrants for shipment at the psychological moment. This tale is utterly untrue, but its dissemination put prices up just the same. Local gossip here referred contemptuously to butchers and grocers haunting iron brokers' offices with pockets full of cash and putting down margins of 6s. a ton for a deal in warrants. The gibe was slanderous, no doubt, but it not inaptly illustrated the rag-tag character of a portion of the buying.

Apart from all this, however, things are really very good. Ferromanganese is in huge demand and costs are going up owing to dear freights from India, though prices are almost sure to be raised again officially. Just at present it is hard to know exactly what the position of makers is, for in spite of the understanding between them all sorts of prices are named, while some works will not quote at all even in connection with big quantities for delivery over the whole of next year for Russia and the Far East. Actually £10 5s. has already been paid f.o.b. for the United States, while one works now quotes £10-15s. f.o.b. and another names £11 c.i.f.

American agents have sold a little half-finished steel, but have turned down business in a number of quarters believing that they can get better rates later on. Possibly they may, but selling prices today are pretty good. Meanwhile one big independent American steel company has succeeded in postponing its October-November shipments until January-March, when it anticipates being able to arrange the business more comfortably than is possible at present. The Germans have booked big contracts in sheet bars at 107s. f.o.b., and have taken lines of billets all over the country at 102s. 6d. f.o.b. Antwerp. The shipyards are now getting into difficulties through their inability to obtain material and some of the vessels on the Clyde are six months behind their construction program. The advance in prices is certainly beginning to be felt by shipowners, who are kicking hard against the high prices demanded by builders for new tonnage.

Metal Market

NEW YORK, October 9, 1912.

The Week's Prices

Cents Per Pound for Early Delivery.							
Copper, New York.		Tin,		Lead—		Spelter—	
				New	St.	New	St.
Oct.	Lake.	Electro.	New York.	York.	Louis.	York.	Louis.
3.....	17.87½	17.70	50.45	5.10	4.95	7.65	7.50
4.....	17.87½	17.70	50.45	5.10	4.95	7.65	7.50
5.....	17.87½	17.70	...	5.10	4.95	7.65	7.50
7.....	17.87½	17.70	50.05	5.10	4.95	7.60	7.45
8.....	17.87½	17.70	49.65	5.10	4.95	7.60	7.45
9.....	17.87½	17.70	50.00	5.10	4.95	7.60	7.45

Copper is quiet with unchanged but practically nominal prices. Tin is dull, but prices continue around 50c. Lead is quiet but firm at unchanged prices. Spelter is a little lower. The better grades of antimony have advanced.

New York

Copper.—In a market which has been dull for the last week or 10 days copper prices have maintained their strength. At present not much Lake copper of any position is being offered, which in a large degree accounts for its strength and price of 17.87½c. There was some buying last week, and although the tonnage was not large it was sufficient to stimulate the market and cause the asking price to go to 18c., especially for certain special brands. At the higher figure, however, little or no business was done, so far as reported, and it is more correct to quote Lake at the nominal price of 17.87½c. Electrolytic has undergone little or no change and its situation also is largely nominal. The Copper Producers' statement for September, issued yesterday, with its showing of a falling off in deliveries of 25,481,962 lb. and an increase of over 16,000,000 lb. in stocks had little effect on prices either at home or abroad. The statement is construed as not favorable from the viewpoint of the increase of stocks and the large production for the month (140,089,819 lb.) but not bad from the viewpoint of the relatively small stocks, which even now are far from excessive and might well be larger to meet unexpected contingencies. The situation abroad is unsettled, with the Balkan troubles, of course, as the chief cause. This morning's cable stated that Rio Tinto, one of the important speculative copper stocks in London and Paris, had declined \$15 a share in London, but it must be remembered that there is wide difference between speculative stocks and the metal itself and that the influence of the former on the metal is mostly sentimental. The price of copper in London this morning was £77 6s. 3d. for spot and £78 5s. for futures. The exports of copper this month were 6452 tons.

Pig Tin.—Consumers are carefully avoiding the tin market which consequently has been extremely dull for some days. The attitude of users of the metal appears to be caused by a belief that prices are too high and that if they wait they can do better. There does not appear to be any noteworthy buying of spot tin, something which has characterized most dull periods heretofore. On October 7 there was some inquiry, but no sales were made that could be confirmed. The reports from the tin plate mills that there had been heavy bookings for next year's delivery would seem to indicate a consequent demand for pig tin, but it has not as yet materialized, although, of course, large quantities of tin are being delivered on contract and going into consumption. The price of tin in London this morning was £228 10s. for spot and £227 5s. for futures. The arrivals this month aggregate 1195 tons and there is afloat 3340 tons.

Tin Plates.—The situation is without change in the New York market, which is firm. Reports are that the orders of large consumers are being booked freely for the first half of next year.

Lead.—Of the lead situation it can only be said that it is firm but dull and practically unchanged. The New York price is 5.10c. and the St. Louis price 4.95c.

Spelter.—The market is fairly firm at slightly lower prices and there is a tendency toward dullness. The New York price is 7.60c. and that at St. Louis 7.45c.

Antimony.—There have been further advances and Cookson's is now quoted at 10.12½c., Hallett's, 9.50c., and Chinese and Hungarian grades at 9.25c. Recent good demand and inquiry have subsided and the market is described as rather dull.

Old Metals.—The market is active. Dealers' selling prices are somewhat higher, as follows:

	Cents per lb.
Copper, heavy and crucible.....	16.50 to 17.00
Copper, heavy and wire	16.50 to 16.75
Copper, light and bottoms	14.75 to 15.00
Brass, heavy	10.50 to 10.75
Brass, light	8.50 to 8.75
Heavy machine composition	14.00 to 14.50
Clean brass turnings	9.75 to 10.00
Composition turnings	12.00 to 12.50
Lead, heavy	4.75
Lead, tea	4.50
Zinc, scrap	5.75

Chicago

OCTOBER 7.—Although some of the larger producers are inclined to accept less than 18c. for certain brands of Lake Copper the general market is about as last quoted. In other metals nominal changes only are reported. The general market level is high. We quote as follows: Casting copper, 17.75c.; Lake, 17.87½c. to 18c., in carloads for prompt shipment; small lots, ¼c. to ¾c. higher; pig tin, carloads, 51c.; small lots, 53c.; lead, desilverized, 5c. to 5.10c. for 50-ton lots; corroding, 5.25c. to 5.35c. for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 7.70c.; Cookson's antimony, 10.75c., and other grades, 9.75c. in small lots; sheet zinc is \$9.10 f.o.b. La Salle or Peru, Ill., less 8 per cent. discount in carloads of 600-lb. casks. On old metals we quote buying prices for less than carload lots: Copper wire, crucible shapes, 15.50c.; copper bottoms, 14c.; copper clips, 15c.; red brass, 12.75c.; yellow brass, 10c.; lead pipe, 4.25c.; zinc, 5.50c.; pewter, No. 1, 33c.; tinfoil, 39c.; block tin pipe, 45c.

St. Louis

OCTOBER 7.—Some advances are noted. Lead is firm after a recession to 4¾c. and spelter is strong at 7.45c. to 7.50c. Lake copper is quoted at 17.97½c. to 18.22½c., with electrolytic at 17¾c. to 18¾c. Tin is 50.45c. to 50.70c. Cookson's antimony is 10½c. In the Joplin ore market there was a continuance of the firmness, broadly speaking, though there was some recession of zinc blende prices. The quotations of the week were strongly held at the close, the range for 60 per cent. being from \$57 to \$62 per ton, with the choicest lots commanding \$65. The price recession has had no effect on production, which is being kept up to the maximum. Lead ore rose sharply to \$68 for 80 per cent., being the highest figure in recent years and \$2 over the previous week's prices. Calamine sold on a range from \$27 to \$28 for 40 per cent., with the choicest lots commanding as high as \$36. We quote miscellaneous scrap metals as follows: Light brass, 6.50c.; heavy brass and light copper, 10.50c.; heavy copper and copper wire, 13c.; pewter, 25c.; tinfoil, 32c.; zinc, 4.50c.; lead, 4c.; tea lead, 3c.

Iron and Industrial Stocks

NEW YORK, October 9, 1912.

The past week was another period of activity in which prices attained high levels, from which there was some recession. Cambria Steel and Pennsylvania Steel were especially conspicuous in their upward movement, retaining their top price. The range on active iron and industrial stocks, from Wednesday of last week to Tuesday of this week, was as follows:

Bald. Loco., com....	58½-58¾	Pressed Steel, com....	39¼-40¾
Bald. Loco., pref....	106¼-106½	Railway Spg., com....	39¼-39¾
Beth. Steel, com....	48½-51¾	Railway Spg., pref....	102¾-103
Beth. Steel, pref....	78¾-79½	Republic, com....	32¾-35½
Can, com.....	43¾-45¾	Republic, pref....	91½-92½
Can, pref.....	123-124½	Sloss, com.....	57-58
Car & Fdry., com....	61½-62¾	Pipe, com.....	19¾-20½
Car & Fdry., pref....	117½-118	U. S. Steel, com....	78¾-80¾
Steel Foundries....	40¾-44½	U. S. Steel, pref....	115½-116½
Colorado Fuel.....	41½-43¾	Westinghouse Elec....	84¾-85¾
General Electric....	182½-184	Va. I. C. & Coke....	68-71½
Gr. N. Ore Cert....	49¾-51¾	Am. Ship, com....	59-61
Int. Harv., com....	122¼-125¾	Am. Ship, pref....	101¼-102½
Int. Harv., pref....	119¾-120	Chic. Pneu. Tool....	53-54½
Int. Pump, com....	27¾-28½	Cambria Steel.....	50-54½
Int. Pump, pref....	80½-81¾	Lake Sup. Corp....	33¾-34
Lackawanna Steel....	50½-53	Pa. Steel, pref....	99-105
Locomotive, com....	43¾-44¾	Warwick.....	10¾
Locomotive, pref....	108½	Crucible Steel, com....	18¼-19
Nat. En. & St., com....	18¼-21	Crucible Steel, pref....	97-97½
Pittsburgh St., pref....	103	Harb. Wk. Ref., com....	50

Dividends Declared

The E. W. Bliss Company, regular quarterly, 2 per cent. on the preferred stock, payable October 1.

The Harbison-Walker Refractories Company, regular quarterly, 1½ per cent. on the preferred stock, payable October 19.

The Nova Scotia Steel & Coal Company, Ltd., regular quarterly, 1½ per cent. on the common and 2 per

cent. on the preferred stock, both payable October 15. The Rhode Island Perkins Horseshoe Company, regular quarterly, 1 per cent. on the preferred stock, payable October 15.

Personal

Henry M. Lane, formerly editor of Castings, published by the Gardner Printing Company, Cleveland, has established an office and core-testing laboratory in Detroit, Mich. To carry on the work he has organized the H. M. Lane Company with offices at 18 Piquette avenue, East, Detroit. Olin F. Flumerfelt, chemical engineer, is associated with Mr. Lane in the company and they will conduct a general foundry and metallurgical consulting engineering business, making a specialty of core room work.

Robert S. Alter, secretary American Tool Works Company, Cincinnati, Ohio, will sail from New York October 12, for a business trip to Europe.

A. H. Teuchter, president Cincinnati Bickford Tool Company, Oakley, Cincinnati, Ohio, is absent on a business trip to Canada. He will return in time to attend the annual meeting of the National Machine Tool Builders' Association in New York.

Murray Shipley, Lodge & Shipley Machine Tool Company, Cincinnati, Ohio, sails from New York October 12, for an extended business stay in Europe.

A. J. Larmon, Rahn-Larmon Company, Cincinnati, Ohio, is making a business visit to several Canadian trade centers, and will return by way of New York to attend the National Machine Tool Builders' Association's annual meeting.

Thomas B. Rogerson, a director of the Dayton Coal & Iron Company, whose headquarters are in Glasgow, Scotland, has returned home after an extended business visit to the company's plant at Dayton, Tenn., and to its sales offices in Cincinnati.

Otto H. Falk, Milwaukee, Wis., receiver of the Allis-Chalmers Company, has been elected president of the Bullock Electric Company, Norwood, Ohio, a subsidiary company of the first named. He succeeds Edward D. Adams of New York.

Kern Dodge has returned from a year's travel abroad and announces the opening of an office in the Morris Building, Philadelphia, Pa., where he will devote himself to the engineering and financing of public service properties. He was one of the founders of the well-known engineering firm, Dodge & Day. His new offices are in the suite with the banking firm of William A. Read & Co.

Fred Krebs, who some time ago resigned as manager of sales of the Cambria Steel Company, Johnstown, Pa., was presented with a gold watch and chain by his former associates in the sales department.

W. S. Chase, general sales manager National Acme Mfg. Company, Cleveland, Ohio, has returned from a three months' vacation tour, which took in the Pacific coast.

M. E. Barden, formerly with the National Acme Mfg. Company, Cleveland, Ohio, has become associated with the Buckeye Twist Drill Company, Alliance, Ohio, as secretary and general manager.

E. G. Buckwell, secretary and manager of sales of the Cleveland Twist Drill Company, Cleveland, Ohio, sailed for Europe October 5 for a business trip of two months' duration.

Bertram D. Robinson, who for many years has been identified with the pig-iron industry and for the past five years has represented B. Nicoll & Co., New York City, in the Eastern States, has severed that connection and become engaged with the Whitehead Brothers Company, foundry supplies, Providence, R. I. He will cover New England, taking the position of the late George S. Bullock, who traveled for the company for over 35 years.

Ernst Krause, of Donauwerk, Krause & Co., Vienna, Austria, sailed for Europe October 8, after a stay of six weeks in this country. He came here to represent the Manufacturers' Association of Austria at the sixth congress of the International Association for Testing Materials, and also the Chamber of Commerce of Vienna at the international meeting of Chambers of Commerce at Boston. In departing Mr. Krause said he was pleased with his reception in the United States and declared the

visit a most profitable one in point of informative data gathered.

Stedman Bent, recently purchasing agent Pennsylvania Steel Company, has opened an office at 730 Real Estate Trust Building, Philadelphia, Pa., and will represent the Treadwell Engineering Company, Easton, Pa., and Treadwell Construction Company, Midland, Pa., in their line of castings and construction work, and T. H. Symington Company, Baltimore, Md., manufacturer of journal boxes and draft gears. Mr. Bent has associated with him Richard Peters, late vice-president Birmingham Iron & Steel Company.

Charles B. Nash, assistant advertising manager of the Standard Sanitary Mfg. Company, Pittsburgh, will again be instructor in the advertising class of the local Young Men's Christian Association, having made such a success of this work last winter.

J. T. Buckley, Jenkins Building, Pittsburgh, for some years local representative of Jenkins Brothers, valve and packing manufacturers, has been transferred to the general sales offices of the company in New York City. He is succeeded in the Pittsburgh office by S. R. Funk, formerly connected with the Philadelphia office.

Henry A. Butler, of the Youngstown Sheet & Tube Company, Youngstown, Ohio, has been placed at the head of the order department.

E. S. Jenison, formerly with Henion & Hubbell, Chicago, has been appointed manager of the pump department of the Canadian Fairbanks-Morse Company, Ltd., now the exclusive sales agent in Canada for the Goulds Mfg. Company, Seneca Falls, N. Y.

Alfred Still has been appointed chief electrical engineer of the mining department of the Algoma Steel Corporation, with headquarters at the Magpie Mine, Ont. He was formerly electrical engineer of the Lake Superior Power Company, Sault Ste. Marie, Ont.

Obituary

GEORGE W. WELLS, Southbridge, Mass., president American Optical Company, is dead at the age of 66 years. He was one of the founders of the company and devoted his life to building it up from a small beginning to one of the largest industries of the kind in the world. He had been president of the Harrington Cutlery Company, Southbridge, and was a director of the Warren Steam Pump Company, Warren, Mass. He leaves three sons and a daughter.

BENJAMIN SPEARMAN, president Bessemer Foundry Company, died at his home in Grove City, Pa., October 1, aged 48 years. He was prominent in local affairs and a member of the Duquesne Club, Pittsburgh. He was a son of the late J. J. Spearman, for many years president Spearman Iron Company, Sharpsville, Pa.

FRANK WILSON, senior member of the firm of Wilson Brothers, manufacturers of bone grinding mills, boilers, etc., Easton, Pa., died September 25. His death will cause no interruption in the conduct of the business.

JOHN F. MERRILL of Holbrook, Merrill & Stetson, steel and hardware merchants, San Francisco, Cal., died September 29 at his home in Menlo Park, Cal.

September Copper Production and Stock

The Copper Producers' Association has issued its monthly statement for September, which makes the following showing when compared with August:

	September Pounds.	August Pounds.
Stock of marketable copper of all kinds on hand at all points in the United States at first of month	46,701,374	50,280,421
Production of marketable copper in the United States from all domestic and foreign sources in the month	140,089,819	145,628,521
Deliveries of marketable copper in the month:		
For domestic consumption	63,460,810	78,722,418
For export	60,264,796	70,485,150
Total deliveries	123,725,606	149,207,568
Stock of marketable copper of all kinds on hand at all points in the United States at close of month	63,065,587	46,701,374

The September production shows a decrease as compared with the production in August. The latter month was exceptional, being the largest on record. Deliveries were much lower in September. The net result was an increase of the stock by 16,364,213 lb.

Pittsburgh Steel Company's Report

The Pittsburgh Steel Company has issued its report for the year ended June 30, 1912. The income account compares as follows:

	1912.	1911.	1910.
Sales, etc.	\$11,649,149	\$11,774,356	\$11,670,918
*Expenses	10,337,595	10,507,104	10,415,106
Net earnings	\$1,311,554	\$1,267,252	\$1,255,812
Other income	10,019	5,924	28,782
Total income	\$1,321,572	\$1,273,176	\$1,284,594
Charges	21,183	191,669	369,672
Surplus	\$1,300,388	\$1,081,506	\$914,922
Dividends	1,031,117	741,899	479,520
Surplus	\$269,271	\$339,608	\$435,402

*Material used and cost of operations (including repair and maintenance of plants), selling and general expenses.

The general balance sheet as of June 30, 1912, compares as follows:

	1912.	1911.
Assets		
*Real estate, plant and equipment	\$14,174,085	\$13,336,519
Stocks and subsidiary companies	330,000	330,000
Cash	2,985,677	905,938
Notes receivable	777,942	79,759
Accounts receivable	2,203,080	1,458,509
Loans and advances		864,168
Material and supplies	2,444,178	2,123,579
Prepaid charges		6,913
Total	\$22,914,962	\$19,105,386
Liabilities		
Preferred stock	\$10,500,000	\$7,000,000
Common stock	7,000,000	6,000,000
Subscription receipts on common		484,270
Real estate, bonds and mortgages	30,000	30,000
Time and demand loans	466,000	950,000
Accounts payable	1,167,101	1,028,866
Dividends payable		129,660
Profit and loss surplus	3,751,861	3,482,589
Total	\$22,914,962	\$19,105,386

*Patent rights are not included.

The Weirton Steel Company, Weirton, W. Va., has been organized with a capital stock of \$300,000, and proposes to build a plant for the manufacture of cold rolled strip steel and other specialties, to have a capacity of about 1500 tons per month. E. T. Weir is president; E. W. Mudge, vice-president; S. L. McCormick, secretary, and W. B. Dickson, treasurer. Work on the plant will be pushed, and it is expected to be in operation in May or June. The company is an identified interest to some extent of the Phillips Sheet & Tin Plate Company. S. L. McCormick, the secretary, has been connected for some years with the West Leechburg Steel Company, manufacturer of cold rolled strip steel.

The Manufacturers' standard for flanged fittings, which became effective October 1, is published in pamphlet form in a bulletin covering the dimensions of the various fittings and templates for drilling bolt holes. A copy can undoubtedly be had by addressing W. H. Douglas, secretary, Committee of Manufacturers on Standardization of Fittings and Valves, 30 Church street, New York.

The Wheeling Sheet & Tin Plate Company, Wheeling, W. Va., has placed a contract with the Cleveland Crane & Engineering Company, Cleveland, Ohio, for electric cranes for its new tin plate plant. The order includes two 15-ton cranes with 72 ft. span; one 15-ton, with 57 ft. span; one 15-ton, with 42 ft. span; one 15-ton, with 40 ft. span, and one 5-ton, with 28 ft. span.

The Brown Instrument Company, Philadelphia, Pa., and its associate company, the Keystone Electrical Instrument Company, have found it necessary to arrange for triple the amount of space after the first of the year that they now occupy. These two companies have found a very large increase this year in the demand for their pyrometers, thermometers and electrical instruments, and an increase in their factory has been found necessary to keep up with their constantly growing business.

The H. Koppers Company, Chicago, has been awarded an order for by-product coke ovens by the Maryland Steel Company, Sparrows Point, Md. The installation will consist of six 15-ton ovens, and construction will begin this month.

The Steel Corporation Dissolution Suit

Hearings at Pittsburgh Begun October 1—
Tin Plate and Steel Manufacturers and
Rolling Mill Machinery Makers Examined

The hearings in the suit of the Government for the dissolution of the United States Steel Corporation, adjourned in New York June 19, were resumed in Pittsburgh October 1. The hearings are being held in room 309 Federal Building, and are expected to last at least six weeks.

Tin Plate Manufacturers Are Called

William H. Griffiths, president Griffiths Charcoal Iron Mills, Washington, Pa., was the first witness called. He was a stockholder in the Washington Tin Plate Company, which sold out to the American Tin Plate Company in 1898. He said that his company was doing a profitable business when it was sold. After the sale he attempted to build other mills and had much trouble in getting the machinery with which to equip them, but finally obtained it. Among others he applied to the Lloyd-Booth Company, Youngstown, which refused to furnish machinery unless he would sign an agreement not to roll any sheet steel. The original cost of the Washington Tin Plate Company was \$92,000 and it was sold for \$320,000 in stock of the American Tin Plate Company, half common and half preferred.

E. R. Crawford, president McKeesport Tin Plate Company, testified that he had been secretary of the United States Tin Plate Company, Demmler, taken over by the American Tin Plate Company. It was capitalized at \$500,000 and sold for \$550,000. There were 11 mills which cost originally about \$30,000 each, and the real estate holdings were valued at about \$20,000. The holders of the stock of the absorbed company were offered the option of cash or stock and they took the latter on the basis of two for one. Asked to estimate the value of the properties acquired at that time by the American Tin Plate Company, he said that he would value them at about \$10,000,000.

Charles H. Booth, Lloyd-Booth Company, Youngstown, Ohio, builder of sheet and tin plate mills, told of attending a meeting of men engaged in business similar to that of his own at Chicago, at which contracts were entered into with the American Tin Plate Company whereby they were bound not to build mills for others than that company. These contracts were lived up to for a short time, when they were suddenly terminated by orders of Charles M. Schwab, who was then president of the Steel Corporation. This was in 1899. Mr. Booth could not remember what became of the documents after the contracts were terminated.

B. G. Follansbee, Follansbee Brothers Company, gave testimony regarding his attendance at meetings of sheet and tin plate manufacturers in 1908 and 1909. The meetings were usually called by telephone or by letter from James A. Campbell, of Youngstown. The meetings were sometimes called several weeks after a Gary dinner would be held in New York. No records were kept of the meetings. Several days after the meetings the prices would be named as then decided on and they would usually remain in force until the calling of another meeting. He said that prices would be set following a discussion in which everyone would give his opinion as to what they should be. Sometimes the prices would not be satisfactory to all and sometimes firms would be accused of selling below these prices, but there was no penalty. His company had never refused to sell to anyone and had never entered into an agreement to refuse to sell the output. After the formation of the Steel Corporation he had some trouble getting black plate, but always succeeded in doing it. His company made an agreement to assign two brands of its goods to the American Tin Plate Company and was to receive a reduction in the price of black plate if it purchased in certain amounts. He and his associates then built a steel plant of their own, but had bought some black plate from the Steel Corporation since that time.

President James A. Campbell Testifies

James A. Campbell, president Youngstown Sheet & Tube Company, described the first Gary dinner in New York in November, 1907. Following that meeting a gen-

eral committee and three subcommittees were appointed, one representing the tin plate and sheet steel manufacturers, one the tube manufacturers and one the makers of billets. The general committee, to the best of his recollection, was composed of Willis L. King, of the Jones & Laughlin Steel Company; E. A. Clarke, of the Lackawanna Steel Company; a representative of the Republic Iron & Steel Company and Charles M. Schwab. He did not know the purpose of the appointment of the committees until after the dinner and a speech by Judge Gary. Then he understood that it was to have the different interests come together to talk over and fix prices. Shortly after the dinner he had attended a meeting of manufacturers of sheet steel held in Pittsburgh, which was the outgrowth of the appointment of the subcommittees. The meeting was attended by 90 per cent. of the sheet steel manufacturers, and its object was to make stable prices in order to protect jobbers, consumers and manufacturers. Each representative was asked to state the volume of his business, conditions, etc., after which a discussion ensued and prices were generally understood before the meetings were over. There was no agreement as to prices, either written or verbal; no penalty or restriction as to output was mentioned. It was understood that the prices named at these meetings would be the prices asked by all the companies represented until they notified their competitors of a change in the scale. Mr. Campbell said that some observed the understood prices, while others did not; that it was just a mutual understanding that the prices set would be maintained. The witness said that he understood that the tube and billet subcommittees met for the same purpose as the sheet makers.

Mr. Campbell was then asked regarding rates on ore charged his company by the Steel Corporation. He said that his company owned mines of its own in the Lake Superior district and the ore was hauled by railroads controlled by the United States Steel Corporation to the Lake Superior ports. He testified that his company paid a royalty to owners of the ore lands of 25 to 30 cents a ton and a bonus of \$150,000 on ore property which they did not buy outright. For the hauling of the ore from the mines to the lake ports his company paid the Steel Corporation 80 cents a ton from 1903 until about a year ago, when the rate was reduced to 60 cents. This rate, he said, gave the United States Steel Corporation an advantage over him in the market, being an excessive one, and a reasonable charge would be 45 cents per ton. His company is placed at a disadvantage of \$1.05 a ton in the producing of pig iron.

Julian Kennedy Makes Sensational Statements

Julian Kennedy, the well-known consulting engineer, being called to the stand, said that the Steel Corporation, by reason of its strong position in the trade, and its low cost of making steel, could put its competitors out of business if it desired to do so.

"Do you regard the Jones & Laughlin Steel Company as a competitor of the Steel Corporation?" he was asked.

"I do."

"Don't you think it would be difficult for the Steel Corporation to put this company out of business?"

"It would be."

"Don't you think that this would be impossible?"

"I do not."

"Have you the same opinion in regard to the Pennsylvania Steel Company, the majority of whose stock is owned by the Pennsylvania Railroad Company?"

"It would not be able to exist unless the railroad company would back it strongly."

"How about the Cambria Steel Company?"

"I don't think it could stay alive."

"Even with the backing of the Pennsylvania Railroad Company?"

"It just depends on the backing."

Mr. Kennedy said that there was no independent company existing to-day that could make steel as cheaply as

the Steel Corporation and added that it could sell \$1 a ton cheaper than any of its competitors.

Mr. Severance, attorney for the Steel Corporation, asked:

"Is it not advantageous to have an abundant ore supply in connection with the ownership and operation of a steel mill?"

"Yes, I think it is."

"Is there not a legitimate profit at each step of the business from the time that the ore is taken from its beds to the time the finished product is put on the market?"

"Yes, I think there is."

"Well, don't you think that it would be advantageous to have a plant combining all of these features in the manufacture of steel?"

"Yes. But I don't think that the carrier should be a part of the system."

"Yes, I know that, Mr. Kennedy. I read your remarks made down in Washington, but we won't try railroad rates here; they will be tried by the Interstate Commerce Commission."

"Yes, we will try those rates here," interposed Judge Dickinson for the Government.

"Well, if you do you will have to get different witnesses from Mr. Kennedy," was the retort of Attorney Severance.

"Mr. Kennedy, has there not been a large increase in the structural iron business in the past ten years?"

"Yes, I think so."

"It is advantageous, is it not, to have the plants of the American Bridge Company located around the country?"

"I would think so."

"And it would not be very easy to monopolize the business either, would it?"

"No, I don't think it would be very easy to do it."

The witness admitted his putting the ore rate at 45 cents before the Stanley Committee was mere guesswork, as he was not a railroad rate expert.

Mr. Kennedy, on cross-examination, said that since the organization of the United States Steel Corporation he had invested his money in outside interests, and had not felt any apprehension over the probability of that corporation wiping him off the earth.

Exclusive Machinery Contracts

James S. Seaman, of the Seaman-Sleeth Company, told of entering into a contract with the United States Steel Corporation in 1898, engaging his company to make all the rolls used by the American Tin Plate Company and the American Sheet Steel Company for a term of three years. He testified that it was stipulated in the contract that his company was prohibited from making rolls for new mills that might be built. He was asked when this contract terminated, and he replied that it did not run its full time.

"Were the contracts not drawn up March 7, 1902?"

"I think it was about that time. They were canceled by the United States Steel Corporation. Mr. Schwab called us all to New York City and canceled them."

The witness was asked if there were not some among the foundrymen who did not want to cancel their contracts and he replied there were.

Attorney A. Leo Weil was called. His name had been mentioned by a previous witness, who said the contracts between the tin plate company and the foundrymen were in the hands of Attorney Weil. Immediately upon assuming his seat in the witness chair, he said that, inasmuch as he had been the attorney for the American Tin Plate Company and American Sheet Steel Company, and was not now holding the position, and that the matter about which he would likely be asked to testify might affect the interests of the companies, he would be compelled to stand on the rights of professional privilege and decline to answer any questions that might affect the interests of the companies referred to. Attorney Reed, for the United States Steel Corporation, waived the rights that the Steel Corporation might claim and allowed Attorney Weil to answer, if he chose.

Attorney Corneau, for the Government, then asked the witness if he knew of the contracts referred to which were reported to have existed between the foundrymen and the American Tin Plate Company, and the foundrymen and the American Sheet Steel Company, and he said that he had known of them, but could not say where they were now.

"They were given to me, I believe, but whether they have been since destroyed or have been lost I am unable to say. The contracts were all canceled. I took that of the foundrymen to New York City, to the offices of the United States Steel Corporation and there the contracts were canceled after more than a week of negotiations with the foundrymen."

"Who participated in the negotiations for the cancelling of the contracts?"

"Officers of the United States Steel Corporation."

"Who were the officers of the United States Steel Corporation who took part in the canceling of the contracts?"

"Well, one of them was William B. Dickson, first vice-president, and later and finally, Mr. Schwab, the president, joined us."

George Alexander Hogg, who is now retired, but who was in the foundry business for a number of years, testified that his company had made contracts with the American Sheet Steel Company and the American Tin Plate Company in regard to the making of rolls, but soon after the formation of the Steel Corporation these contracts were broken on the insistence of President Schwab. One stipulation of the contract was not to make rolls for any new mills that were started thereafter, but they could make rolls for any of the companies in existence at the time the contracts were made.

William A. Herron, president Lewis Foundry & Machine Company, and Henry C. Shaw, vice-president Garrison Foundry Company, testified along similar lines.

Some Merger Testimony

J. P. Whitla, Sharon, Pa., attorney for the Sharon Steel Company in 1899-1900, told of the merger into the United States Steel Corporation of that company in 1900. The products of the company were blooms, slabs, billets, sheet and tin bars, rods, plain wire, barbed wire and wire nails. It owned a majority of stock in the Sharon Tin Plate Company and the Sharon Sheet Steel Company. The owners of the company were offered a good price and were glad to take advantage of it because other business interests demanded most of their time. He did not believe the price of \$5,000,000 paid for the Sharon Steel Company's ore holdings was excessive, as it figured out about 25 cents per ton for the ore in the ground.

Charles A. Painter, formerly actively identified with the hoop industry, told of the formation of the American Export Company, organized for the purpose of cultivating foreign trade in hoops and bands, and which preceded the organization of the American Steel Hoop Company. Questioned as to why the price of hoops was raised following the forming of the American Steel Hoop Company, he said the jobbers thought that there was a scarcity of billets for the making of the hoops, and every jobber rushed in with orders. He told of going to the Carnegie Steel Company before the formation of the American Steel Hoop Company, shortly before the expiration of the contract that his company had for billets, and of being told that when the contract ran out the Carnegie Company would furnish no more billets, as it needed all that it could make for its own consumption. He said the price paid by the American Steel Hoop Company for his company's mills was about \$1,250,000.

J. P. Brennan, now connected with the Thompson-Connelville Coke Company, but from 1886 to 1896 with the McClure Coke Company, said that after the Frick Coke Company bought up smaller coke companies in the Connelville region it owned 75 per cent. of the coke lands in that section. He said that J. V. Thompson now owned more coking coal land than the Frick company; that the latter controlled not more than 50 per cent. of the southwestern Pennsylvania output, and had no monopoly.

F. L. Clark, Pittsburgh, retired, formerly president of the William Clark's Sons Company, was asked regarding the state of competition among hoop and band makers prior to the time of the formation of the American Steel Hoop Company. He said that the companies merged into the American Steel Hoop Company controlled about 50 per cent. of the country's capacity for producing cotton ties, about 5 or 10 per cent. of the capacity for making common iron bars and less than 50 per cent. of the capacity for making hoops and bands. It was brought out in the cross-examination that the American Steel Hoop Company could have supplied over twice the country's demand for hoops in dull times and that the independent companies making hoops could have produced two and a half times the country's requirements in such times; told of signing contracts not to engage in the steel hoop business in the United States with the exception of three states.

H. B. Lupton, Pittsburgh, formerly secretary of the

Oliver Wire Company, testified regarding the conditions ruling in the steel and wire industry at the time the American Steel & Wire Company was formed. He explained that his duties with the Oliver Wire Company were largely to smooth out difficulties with customers. While he stated that the American Steel & Wire Company almost entirely controlled the market price of wire, he said that its influence was not always in the direction of advancing prices, as it had in one day lowered the price from \$3.25 to \$2.25 per 100 pounds.

The Corporation's Ore Holdings

W. P. Snyder, Pittsburgh, was questioned regarding the ore holdings of the United States Steel Corporation. He stated that in his opinion the corporation's holdings are no larger than is demanded by common business prudence. He stated that the average royalty paid on Lake Superior ore from 1896 to 1901 was from 15 to 25 cents a ton. The highest royalty in that time was 35 cents, paid by the Clairton Steel Company. Since 1901 there has been an increase to 50 and 75 cents per ton, caused by the increased demand for ore generally and the development of furnaces so that Mesaba ore can be used to better advantage. In the 90's, he said, furnacemen had not learned to handle that ore as advantageously as at present.

He said that the United States Steel Corporation had secured a bargain when it took over the Clairton Steel Company, which at the time was in the hands of a receiver, and the sale was made with the permission of the United States Court. He had also made plans at the time to purchase the properties of the Clairton Steel Company, but these plans fell through. He gave some testimony regarding the billet pool of which the Oliver & Snyder Steel Company was a member in 1899. He did not remember the basis per ton on which the pool operated with regard to charges for sales made over allotments or for allowances from the pool fund to those who did not sell up to their allotment.

Pittsburgh and Vicinity Business Notes

The Sharon Iron & Metal Company, Sharon, Pa., will spend about \$15,000 in improvements to its plant which will include an electric crane and a steel magnet, the latter for handling scrap in the yards.

The American Stamping Company, Irwin, Pa., maker of milk and ice-cream cans, will move its plant to Washington, Pa. The Washington Board of Trade guarantees the company a loan of \$15,000 for a site and building and removal expenses and the company agrees to invest \$20,000 in cash besides its present assets.

The H. C. Frick Coke Company has been awarded a medal for its specialized exhibit in accident prevention, industrial hygiene and mutuality by the International Exposition of Hygiene at Dresden, Germany. The exhibit is now a part of the permanent collection in the Berlin Museum of Safety.

Among the very recent purchasers of Tate-Jones rivet forges, built by Tate-Jones & Co., Inc., Pittsburgh, are the E. Keeler Company, Kennicott Company, American Bridge Company, Hockensmith Wheel & Mine Car Company, Standard Oil Company, Western Gas Construction Company, McMyler Interstate Company and the Lake Shore Engine Works. This rivet forge is being shipped all over the world.

Among contracts recently secured by the Riter-Conley Mfg. Company, Pittsburgh, is the construction of a complete plant for the Olympic Portland Cement Company in the state of Washington, requiring about 1000 tons of steel; all the steel buildings for the two new blast furnaces of the Pittsburgh Steel Company, Monessen, Pa., taking about 1600 tons; a charcoal blast furnace for the Standard Chemical Iron & Lumber Company, Parry Sound, Ontario, about 500 tons; a 2,000,000-ft. gas holder for the Queensborough Gas & Electric Company, Rockaway Park, N. Y., about 1500 tons; a 4,000,000-ft. gas holder for the Worcester Gas Light Company, Worcester, Mass., 2200 tons; a 3,000,000-ft. gas holder for the Detroit City Gas Company, Detroit, Mich., about 2000 tons; 119 dam gates, weighing 13 tons each, for the Mississippi River Power Company, Hamilton, Ill.; the rebuilding of a blast furnace for the Maryland Steel Company, Sparrows Point, Md., 700 to 800 tons; a cast house for the United Steel Company at Leetonia, Ohio, 200 tons, and a number of high trans-

mission towers, totaling about 1350 tons, besides other smaller jobs. The plant at Leetsdale, Pa., is being operated to full capacity in all departments.

The Westinghouse Electric & Mfg. Company is erecting a new machine shop at East Pittsburgh, 80 x 400 ft., of brick and steel and thoroughly fireproof. Steel windows and sash will be furnished by the David Lupton's Sons Company, Philadelphia.

The West Penn Steel Company, Brackenridge, Pa., manufacturer of black and galvanized sheets, has added three mills, making 10 in all. One of these will roll tin mill sizes of sheets and black plate specialties. The new mills were built to better balance the melting and rolling departments, which are now on about an even basis.

The Erie City Iron Works, Erie, Pa., T. J. McGraw, resident manager, Park Building, Pittsburgh, has received a contract from the W. J. Rainey Company for two 300-hp. vertical water tube boilers, to be installed in the Braddock coal works at Mount Braddock, Pa. This is the fifth repeat order for this type of boiler in that plant.

W. Harry Brown, producer of high-grade Connells-ville coke, South Brownsville, Pa., announces the completion of his Alicia coke crusher at Alicia, Fayette County, Pa. This crusher is of the most improved design and construction, with a capacity of 12 cars per day, and will crush and screen coke into egg, stove, chestnut and pea sizes. The Alicia coke plant has 400 rectangular ovens, producing about 25,000 tons per month, of which 6000 tons will be crushed and screened. Charles F. Colbert, Jr., is sales manager.

The puddling department of the plant of the Wheeling Steel & Iron Company at Wheeling, W. Va., has been started after an idleness of nearly a year.

Molders employed in the foundries of the Shenango Machine Company, Sharon, Pa., and the Sharon Foundry Company, Wheatland, Pa., have had their wages increased from \$3.35 to \$3.75 per day.

It is reported that E. J. Anglin, some years ago superintendent of the Sharon Steel Hoop Company, Sharon, Pa., is promoting a proposition to build a steel hoop mill at St. Louis.

The National Tube Company states that nothing definite has been decided upon in regard to the contemplated additions to its works at Lorain, Ohio. It is considering the installation of a combination blooming and slabbing mill and the addition of three or four open hearth furnaces. The report as to the purchase of additional land at Lorain is incorrect; none has been acquired there for some years past and no purchases are in prospect. The company is not contemplating any additions or extensions of moment to any of its other plants.

The Reed & Prince Mfg. Company has placed with Tate-Jones & Co., Inc., Pittsburgh, an order for one of the latter's case hardening furnaces. Orders have also been received from the Dain Mfg. Company and the Gary Screw & Bolt Company for forging and tempering furnaces.

The blast furnace of the Sharpsville Furnace Company, Sharpsville, Pa., which has been idle for several years, will probably blow in this week on Bessemer iron, making from 150 to 175 tons per day. Banning, Cooper & Co., Pittsburgh, have been appointed sole agents for the sale of the product.

The next meeting of the Pittsburgh Foundrymen's Association will be held at the Fort Pitt Hotel on Monday evening, October 14. Thomas D. West of Cleveland, will present a paper on "Labor in the Foundry." The Entertainment Committee, of which H. E. Paden of the American Steel Foundries, Pittsburgh, is chairman, has prepared an interesting programme for the fall and winter meetings.

No. 8 blast furnace of the Cambria Steel Company, Johnstown, Pa., which has been idle for about two weeks on account of a serious accident, has resumed operations.

No. 3 blast furnace of the Carnegie Steel Company at Farrell, Pa., which has been idle since February, was put in blast last week.

Ivanhoe furnace at Paden City, W. Va., idle for over a year, owned by the Carter Iron Company, Oliver Building, Pittsburgh, is being repaired and will shortly be put in blast. It will be operated on special grades of pig iron, for use mainly by the Monongahela Iron & Steel Company, Hays Station, Pittsburgh, in the manufacture of high grade bar iron and chain iron, the company being an identified interest of the Carter Iron Company.

American Iron and Steel Institute

Recent Additions to the Membership, Which Is Now Nearly 750

From Secretary James T. McCleary we have the following names of persons elected to membership in the American Iron and Steel Institute at the meeting of the board of directors held in New York City October 4. The addition of these names brings the total membership up to nearly 750:

- Abbott, William H., assistant secretary, Wheeling Corrugating Company, W. Va.
 Acomb, W. E., superintendent, Donora Wire Works, American Steel & Wire Company, Donora, Pa.
 Baker, George, general manager, sales, Illinois Steel Company, Chicago.
 Bannister, John C., manager, Kewanee Works, National Tube Company, Kewanee, Ill.
 Beattie, Thomas A., manager, Riverside Works, National Tube Company, Wheeling, W. Va.
 Beecher, Leonard T., secretary and treasurer, Tennessee Coal, Iron & Railroad Company, Birmingham, Ala.
 Block, P. D., vice-president, Inland Steel Company, Chicago, Ill.
 Booth, Charles M., sales agent, American Steel & Wire Company, Worcester, Mass.
 Boutwell, Roswell M., treasurer, Standard Horseshoe Company, Boston, Mass.
 Boynton, Arthur J., superintendent, blast furnaces, National Tube Company, Lorain, Ohio.
 Braman, Harry S., superintendent, blast furnace and steel department, Youngstown Sheet & Tube Company, Poland, Ohio.
 Brassert, Hermann A., superintendent, blast furnaces, Illinois Steel Company, South Chicago, Ill.
 Brown, Richard T., superintendent, Standard works, Shelby Steel Tube Company, Ellwood City, Pa.
 Brunner, John, acting inspecting engineer, Illinois Steel Company, Chicago, Ill.
 Bush, Samuel P., president and general manager, Buckeye Steel Casting Company, Columbus, Ohio.
 Butler, Henry A., assistant general superintendent, Youngstown Sheet & Tube Company, Youngstown, Ohio.
 Camp, James M., chief of bureau of instruction, Carnegie Steel Company, Pittsburgh, Pa.
 Carhart, Perry E., inspecting engineer, Illinois Steel Company, Chicago, Ill.
 Cochran, Garrett, wire rope manufacturer, Williamsport, Pa.
 Coey, Stewart C., assistant master mechanic, Youngstown Sheet & Tube Company, Youngstown, Ohio.
 Coles, T. B., sales agent, American Steel & Wire Company, 30 Church street, New York.
 Cook, Howard D., superintendent, skelp rolling mills, National Tube Company, Lorain, Ohio.
 Cornelius, Wm. A., manager, National works, National Tube Company, McKeesport, Pa.
 Cragin, Geo. A., assistant general sales agent, American Steel & Wire Company, Worcester, Mass.
 Crispin, M. Jackson, general manager, United States Metal & Mfg. Company, New York.
 Deericks, Joseph C., sales agent, American Steel & Wire Company, 30 Church street, New York.
 Deutsch, Samuel, executive committee, Inland Steel Company, Chicago, Ill.
 Dietrich, Louis A., sales agent, American Steel & Wire Company, 30 Church street, New York.
 Dimmick, Frederick D., J. K. Dimmick & Co., Cleveland, Ohio.
 Dunlap, Samuel, assistant auditor, American Steel & Wire Company, Cleveland, Ohio.
 Dunn, J. Jay, general superintendent, Shelby Steel Tube Company, Ellwood City, Pa.
 Elliott, Charles H., assistant superintendent, blast furnaces, Youngstown Sheet & Tube Company, Youngstown, Ohio.
 Faris, Jacob M., master mechanic, Youngstown Sheet & Tube Company, Youngstown, Ohio.
 Fell, Charles, superintendent, pipe and tube mills, Lorain, Ohio, National Tube Company, Lorain, Ohio.
 Field, William A., general superintendent, South works, Illinois Steel Company, South Chicago, Ill.
 Foege, W. H., sales manager, American Steel & Wire Company, Chicago, Ill.
 Gamble, Joseph M., superintendent, Kewanee works, National Tube Company, Kewanee, Ill.
 Garry, Albert H., assistant auditor, American Steel & Wire Company, Cleveland, Ohio.
 Gilbert, H. R., engineer, Continental works, National Tube Company, Pittsburgh, Pa.
 Glass, Andrew, general manager, Portsmouth Steel Company, Portsmouth, Ohio.
 Gocher, John W., chief engineer, Cambria Steel Company, Johnstown, Pa.
 Griswold, Howard C., assistant inspecting engineer, Illinois Steel Company, Chicago, Ill.
 Grugan, F. Justice, mining engineer, Philadelphia, Pa.
 Hamilton, John W. H., consulting engineer, Hamilton & Hansell, 50 Church street, New York.
 Hansell, Nils V., consulting engineer, Hamilton & Hansell, 50 Church street, New York.
 Hazeltine, Benj. F., superintendent, steel works and skelp mill, National Tube Company, Wheeling, W. Va.
 Heberlein, F., superintendent, Consolidated works, American Steel & Wire Company, Cleveland, Ohio.
 Helander, Axel H., consulting engineer, William Tod Company, Youngstown, Ohio.
 Hitz, Albert W., superintendent, Newburg wire mill, American Steel & Wire Company, Cleveland, Ohio.
 Hock, John A., superintendent, Consolidated works, National Tube Company, Pittsburgh, Pa.
 Hoerr, Alex. L., steam and hydraulic engineer, National Tube Company, McKeesport, Pa.
 Howard, David C., president, Delaney Forge & Iron Company, Buffalo, N. Y.
 Humphrys, Ernest S., department manager, sales department, American Steel & Wire Company, Chicago, Ill.
 Ireland, James D., general manager, ore department, M. A. Hanna & Co., Duluth, Minn.
 Johnson, Lewis, department manager, sales department, American Steel & Wire Company, Chicago, Ill.
 Kemp, John E., civil engineer, National Tube Company, Kewanee, Ill.
 Kennedy, Wm. W., superintendent, tube and pipe mills, National Tube Company, Wheeling, W. Va.
 Kenney, Edward T., metallurgical engineer, Cambria Steel Company, Johnstown, Pa.
 Keyes, Frederick A., sales agent, American Steel & Wire Company, 30 Church street, New York.
 King, Austin, chief mine inspector, H. C. Frick Coke Company, Scottdale, Pa.
 Kirk, Robert C., treasurer, La Belle Iron Works, Steubenville, Ohio.
 Kiser, John W., president, Phoenix Horseshoe Company, Chicago, Ill.
 Knight, C. S., Jr., department sales manager, American Steel & Wire Company, Chicago, Ill.
 Latshaw, Jos. W., manager, Pennsylvania works, National Tube Company, Pittsburgh, Pa.
 Laughlin, Alexander, president, Central Tube Company, Pittsburgh, Pa.
 Lees, John W., general superintendent, Inland Steel Company, Indiana Harbor, Ind.
 Llewellyn, Frank J., division contract manager, American Bridge Company of New York, Chicago, Ill.
 Llewellyn, Paul P., Interstate Iron & Steel Company, East Chicago, Ill.
 Lorenz, P., superintendent, H. P. works, American Steel & Wire Company, Cleveland, Ohio.
 Lynch, Henry B., superintendent, galvanizing plant, National Tube Company, McKeesport, Pa.
 Mark, Anson, pipe manufacturer, Chicago, Ill.
 Marshall, Chas. D., president, McClintic-Marshall Construction Company, Pittsburgh, Pa.
 Mathews, John A., manager, Halcomb Steel Company, Syracuse, N. Y.
 Mathias, David R., general superintendent, Joliet works, Illinois Steel Company, Joliet, Ill.
 McCleary, Elmer T., assistant superintendent, blast furnaces, Youngstown Sheet & Tube Company, Youngstown, Ohio.
 McCulloch, John A., engineer, galvanizing works, National Tube Company, McKeesport, Pa.
 MacDonald, Duncan C., district purchasing agent, American Steel & Wire Company, Worcester, Mass.
 McElhany, Chas. B., manager, wire sales, Cambria Steel Company, Johnstown, Pa.
 McIlvain, Edward M., president, Lehigh Coke Company, 72 Broadway, New York.
 Mehlhorn, Wm. M., general superintendent, Eastern Steel Company, Pottsville, Pa.
 Mercur, Robert J., vice-president, Standard Iron Company, Ltd., Montreal, Canada.
 Mowat, Oliver M., superintendent, coupling department, National Tube Company, McKeesport, Pa.
 Neckerman, Wm. M., superintendent, tube department, Youngstown Sheet & Tube Company, Youngstown, Ohio.
 Newton, Peter A., assistant general superintendent, South Chicago works, Illinois Steel Company, South Chicago, Ill.
 Nieman, Chas. F., president and treasurer, Parkesburg Iron & Steel Company, Pittsburgh, Pa.
 Nullmeyer, Frank H., superintendent, rod and wire department, Youngstown Sheet & Tube Company, Youngstown, Ohio.
 O'Connor, Harry, superintendent, North and South works, American Steel & Wire Company, DeKalb, Ill.
 Offutt, John W., superintendent, Shelby Steel Tube Company, Ellwood City, Pa.
 O'Keefe, John, superintendent, American Steel & Wire Company, Sharon, Pa.
 Osborne, Chas. G., metallurgical engineer, Illinois Steel Company, South Chicago, Ill.
 Patton, Albert, superintendent, steel works department, National Tube Company, McKeesport, Pa.

Pratt, Ralph H., sales agent, American Steel & Wire Company, 30 Church street, New York.

Pringle, Oscar L., assistant to superintendent, blast furnaces, National Tube Company, McKeesport, Pa.

Putnam, Chas. H., American Steel & Wire Company, Cleveland, Ohio.

Reilly, Wm. C., general superintendent, Youngstown Sheet & Tube Company, Youngstown, Ohio.

Rosenkranz, Max, mechanical engineer, Continental works, National Tube Company, Pittsburgh, Pa.

Russell, David A., chief chemist, Youngstown Sheet & Tube Company, Youngstown, Ohio.

Schumo, Elmer M., metallurgist, William Wharton, Jr., Company, Philadelphia, Pa.

Simpers, Thomas W., manager, sales, American Sheet & Tin Plate Company, Philadelphia, Pa.

Skewis, Jos. R., Jr., master mechanic, National Tube Company, McKeesport, Pa.

Skinner, Orville C., assistant superintendent, Standard Steel Works Company, Burnham, Pa.

Souder, Harrison, general superintendent, Cornwall Ore Bank Company, Cornwall, Pa.

Stevenson, Malcolm R., superintendent, blast furnace department, National Tube Company, McKeesport, Pa.

Stoughton, Bradley, consulting metallurgical engineer, 165 Broadway, New York.

Suppes, Max, manager, Lorain works, National Tube Company, Lorain, Ohio.

Taylor, William W., vice-president and general manager, Oriskany Ore & Iron Corporation, Lynchburg, Va.

Timmins, George, manager, National Tube Company, Syracuse works, Syracuse, N. Y.

Totten, Wm. J., assistant general manager, sales, Illinois Steel Company, Chicago, Ill.

Underwood, Laurence H., superintendent, blast furnaces, Riverside works, National Tube Company, Wheeling, W. Va.

Waterman, Fred W., mechanical engineer, Lorain works, National Tube Company, Lorain, Ohio.

Weaver, A. T., department sales manager, American Steel & Wire Company, Chicago, Ill.

Westfall, Harry D., secretary, La. Belle Iron Works, Steubenville, Ohio.

Wheeldon, J., superintendent, Cuyahoga works, American Steel & Wire Company, Cleveland, Ohio.

Whitaker, Albert C., president, Wheeling Corrugating Company, Wheeling, W. Va.

White, H. S., superintendent, American Steel & Wire Company, Braddock, Pa.

Williams, Edward H., superintendent, blast furnaces, Thomas Iron Company, Hokendauqua, Pa.

Williams, Idris R., superintendent, steel department and blooming mills, National Tube Company, Lorain, Ohio.

Wilson, James W., superintendent, National works, National Tube Company, McKeesport, Pa.

Witherbee, Silas H., iron mining, Port Henry, N. Y.

Woods, Thomas, assistant general superintendent, Carnegie Steel Company, Pittsburgh, Pa.

Wright, Wm. H., superintendent, coke department, Zenith Furnace Company, Duluth, Minn.

Philadelphia Foundrymen's Association

The Philadelphia Foundrymen's Association held its regular monthly meeting at the Hotel Walton on the evening of October 2. Short addresses were made by representatives who attended the convention of the Atlantic Deeper Waterways' Association, at New London, Conn., and that of the American Foundrymen and Allied Associations at Buffalo, N. Y.

W. N. Best, engineer in caloric, New York City, read a paper on "The Use of Liquid Fuel in Foundry Practice," with which a large number of lantern slides was shown, illustrating installations of fuel oil burning devices for reverberatory, crucible, heating, annealing and forging furnaces. Considerable discussion followed as to fuel consumption under various conditions, the use of oil burning torches for cupola lighting and oil fuel for melting copper, brass and other alloys.

Announcement was made that at the next meeting a motion picture exhibit would be given by Rogers, Brown & Co., showing operations in the mining and transporting of ore, work at the blast furnace, the production of Bessemer and open-hearth steel and the manufacture of finished steel products.

The general sales department of the Titanium Alloys Mfg. Company, Charles V. Slocum, sales manager, has been removed from Pittsburgh to the works at Niagara Falls, N. Y. The company will maintain a district sales office in the old location, Oliver Building, Pittsburgh.

Newark Foundrymen's Association

The first meeting of the season of the Newark Foundrymen's Association, Newark, N. J., held October 2, was addressed by Dr. Richard Moldenke on the subject of "Foundry Sands." Thirty members were present to hear the speaker, who gave an outline of the report he submitted to the recent convention at Buffalo of the American Foundrymen's Association on tests of 80 natural molding sands and on 12 mixtures of sand and fire clay. The report cannot be regarded as complete, he said, until the heat tests are made and the results appended, and this is to be done.

At the business meeting, over which President A. Hanay presided, the Executive Committee was authorized to arrange for the notification of the employees of the members that the association not only urges attendance at the class in foundry practice of the Newark Technical School, but would offer prizes selected by the committee for the most proficient students. George Heggie, instructor of the class, was present and asked for the continued co-operation of the association.

Secretary Arthur E. Barlow announced that the programme of the season is to be an attractive one and asked that all the members work for the growth of the association. George Krouse, of Jersey City, and Alexander McCarte, of the Singer Mfg. Company, were elected to membership. The meeting was preceded by a dinner. The annual meeting and dinner of the association will be held in New York City November 5 and will be followed by a theatre party.

The Sly Company's Expanding Business

The W. W. Sly Mfg. Company, Cleveland, Ohio, which recently completed a 40-ft. two-story addition to its building devoted to the manufacture of dust arresters and other sand blast equipment, is putting in the foundations for another two-story extension 100 ft. in length. Among other contracts it is installing for the Scullin-Gallagher Iron & Steel Company, St. Louis, Mo., a sand blast equipment consisting of four steel sand blast rooms with dust arresters and sand separators, and equipped with Sly No-wear sand blast nozzles. It is also installing two steel sand blast rooms, complete with dust arresters, for the Wheeling Mold & Foundry Company, Wheeling, W. Va.; these rooms are 12 x 15 ft., and are constructed to be thrown into one room, 15 x 24 ft., for the cleaning of large castings, a standard gauge track passing through the rooms for handling large work.

The company's exhaust tumbling mill department is equally busy, there being more than 80 mills now under construction. An installation, consisting of dust arresters and 42 exhaust tumbling mills, is being made at the plant of Parlin & Orendorf, Canton, Ill.

The Morgan Engineering Company, Alliance, Ohio, reports the receipt of the following orders: For eight standard cranes, ranging from 10 to 37½ tons, and three special open hearth floor charging machines, Edgar Thomson works of the Carnegie Steel Company; three 40-ton cranes, with two auxiliary hoists, Anaconda Copper Mining Company; 5-ton magnet handling crane, Ashland Steel Company; three 10-ton and one 30-ton standard mill type cranes, Alan Wood Iron & Steel Company; open hearth charging machine, Lackawanna Steel Company; four standard cranes, ranging from 10 to 35 tons, Thomas works of the Brier Hill Steel Company; 75-ton crane, United Electric Light & Power Company, New York City; 40-ton standard crane, Newport News Shipbuilding & Dry Dock Company.

The Prest-O-Lite Company, Indianapolis, Ind., now building a new plant, has placed a contract with the Rockwell Furnace Company, 26 Cortlandt street, New York, for a complete installation of oil fired furnaces and ovens. The furnaces are the Rockwell over-fired accurate temperature type and will be used for heat treatment. The ovens, car type, will be used for baking asbestos disks. The installation, which is a large one, will have a capacity of heat treating 1200 tanks a day. The H. J. Martin Forging Company, also of Indianapolis, has contracted with the Rockwell Furnace Company for all the furnaces, both heat treating and forging, for the new addition to its plant now being built. Oil will be used as fuel.

N. & G. Taylor Company Improvements

The N. & G. Taylor Company, Philadelphia, Pa., has now under construction as an addition to its plant at Cumberland, Md., a new tin house, 100 x 300 ft., to be equipped with machinery and appliances for the manufacture of tin plates of all kinds. The building is of fireproof construction; steel windows with wire glass, manufactured by the Lyster Sheet Metal Company, Philadelphia, Pa., will be used throughout. The roof is constructed of the Taylor Company's own Target and Arrow brand of tin, laid on 2-in. sheathing boards on steel purlins. These sheathing boards constitute the only woodwork used.

The building will be served through its entire length by a 5-ton Shaw overhead traveling crane operating on a 60-ft. span. A 3-ton overhead monorail, 128 ft. long, with a Shepard electric hoist and conveyor, is being installed to transfer finished black plate from an adjoining building, over railroad tracks and across the yard, to the tinning department. Orders have been placed for the tinning machinery with the Aetna Foundry & Machine Company, Warren, Ohio, and it will be driven by direct connected Westinghouse motors. The pickling machine is of the latest three-arm type and will be furnished by the Mesta Machine Company, Pittsburgh, Pa.

A new power house has been added to the two complete electrical units previously used. It will be equipped with a 250-hp. Ames extra heavy duty, side crank engine, direct connected with a General Electric 150-kw., 225-r.p.m., 250-volt, compound wound, direct current generator. A new General Electric switchboard of the latest design will also be installed. A new two-story storehouse for general mill supplies and another building to house the mill office and the laboratory have also been erected.

In the planning of the various improvements particular attention has been given to economy of operation and facilities for handling the products in the various departments. Further additions to increase the open-hearth department of the plant are now being considered.

With the completion of these improvements, the N. & G. Taylor Company will be prepared to tin black plate at both the Cumberland and Philadelphia plants, while heretofore tinning was done at the latter plant alone. The Cumberland plant now comprises a complete works for the manufacture of the steel from pig iron to the finished tinned sheet, boxed for shipment. Since 1810 the company has been prominent in the tin plate business. Prior to 1892 it imported tin plate exclusively, but with the passage of the McKinley tariff bill it was among the first to engage in the manufacture of tin plates in this country, transplanting old-time methods of production direct from its works in Wales. From 1892 until the present time its tin plates have been finished at the Philadelphia plant, the Cumberland works being used only for the manufacture of black plate. Under the present plan the Eastern business will be taken care of at the Philadelphia plant and the Western business at the Cumberland plant. Specializing in its particular lines, the company is able to furnish either black or coated plates to conform with any special analysis.

The Dominion Stamping Company's drop forging plant at Walkerville, Ont., will be ready for operation next month. It will make all kinds of automobile steel forgings. The company now has 175 men employed, and December 1 it is expected at least 400 men will be at work. About \$100,000 worth of new machinery was installed within the last month. Crude oil is used as fuel for the heating furnaces. The officers of this company, which is practically the only concern in Canada making a business of automobile sheet metal goods and automobile forgings, are as follows: President, treasurer and general manager, John H. French; vice-president, Harry P. Cope; secretary, Walter F. Tant; office manager, Robert W. Nette. The directors are Messrs. French, Cope, Tant and Fred J. Armstrong of Detroit and Charles J. Montreuil of Walkerville. The company has increased its capital stock from \$60,000 to \$250,000. A good deal of the stock is owned by men who operate a plant along similar lines in Detroit.

Pickands, Mather & Co., Cleveland, will blow in their Ella furnace at West Middlesex, Pa., about November 1. It has been idle since June, 1910.

Canadian Iron and Steel Production in 1911

The American Iron and Steel Association, which has already published the statistics of pig iron production in Canada in 1911 (as in *The Iron Age* of March 7, 1912) now gives the statistics of steel ingots and of rolled iron and steel. In additional data on pig iron production it is noted that of a total of 824,368 tons (against 740,210 tons in 1910) 799,716 tons was made with coke and 24,652 tons with charcoal, coke and electricity. The production of basic iron was 413,303 tons, against 365,090 tons in 1910, and of Bessemer iron, 186,274 tons, against 221,494 tons. On December 31 Canada had 18 blast furnaces (14 coke and 4 charcoal), of which 12 were in blast. Two were building. The shipments of iron ore from Canadian mines in 1911 were 187,807 tons, against 231,623 tons in 1910 and 239,324 tons in 1909. Newfoundland not being a part of Canada, Newfoundland ores are not included.

Steel Ingots and Finished Steel

The production of all kinds of steel ingots and castings in Canada in 1911 amounted to 790,871 gross tons, against 741,924 tons in 1910, an increase of 48,947 tons, or nearly 6.6 per cent. The production of Bessemer steel amounted to 189,797 tons in 1911, against 199,570 tons, and open-hearth steel to 601,074 tons, against 542,354 tons. Of the total of open-hearth steel in 1911 581,222 tons was ingots and 19,852 tons castings, against 524,191 tons of ingots and 18,163 tons of castings. All the open-hearth ingots were made by the basic process.

The following table gives the production of various rolled products in the past three years:

	1909.	1910.	1911.
Rails	344,830	366,465	360,547
Structural shapes and wire rods	74,136	80,993	76,617
Plates and sheets	36,241	26,642	14,833
Nail plate, bars, etc.	207,534	265,711	323,427
Total	662,741	739,811	775,424

The total production of forged iron and steel by rolling mills and steel works in Canada in 1911 amounted to about 18,832 tons, of which about 787 tons was iron and about 18,045 tons steel. In 1911 the rolling mills and steel works in Canada which operated cut nail or wire nail factories produced about 652,861 kegs of steel cut nails and steel wire nails, as compared with about 327,580 kegs in 1910, about 374,100 kegs in 1909, and about 298,000 kegs in 1908. In 1911 there were 27 works in 6 provinces which made steel ingots or castings or rolled iron or steel into finished forms, against 24 works in 6 provinces in 1910.

General Electric Equipment Sales

The General Electric Company, Schenectady, N. Y., reports the following:

The Aluminum Company of America, Pittsburgh, Pa., is installing a large 2000 kw. rotary converter and three 735 kva. transformers in its plant at Niagara Falls, N. Y.

The Simonds Mfg. Company, Fitchburg, Mass., is adding to the electric drive equipment of its plant 47 motors, ranging from 1/2 to 35 hp.

The E. & G. Brooke Iron Company, Birdsboro, Pa., is adding to the equipment of its plant a new 25,000 cu. ft. multi-stage blast furnace blower set.

The Union Iron Works, San Francisco, Cal., is equipping its plant with new motor drive and is installing 49 motors ranging from 5 to 20 hp.

The Pittsburgh Crucible Steel Company, Pittsburgh, Pa., is installing two new large units in its power station. The apparatus consists of 500 kva. and 3125 kva. Curtis turbo-generators.

The United Iron Works, Joplin, Mo., in arranging for electric drive in its plant, is installing 26 motors ranging from 1 to 35 hp. with necessary transformers and switchboard.

The Griffin Wheel Company, Chicago, Ill., is equipping its plant at Kansas City, Kan., for electric drive and installing 28 motors ranging from 5 to 100 hp., with transformers and switchboard.

The Youngstown Sheet & Tube Company, Youngstown, Ohio, is adding to the electrical equipment of its plant by the installation of new apparatus consisting of a Curtis turbo-generator of 4375 kva. capacity and three motors of 300, 500 and 550 hp., respectively.

Employees' Free Life Insurance

A Plan Recently Put in Operation
by the Michigan Stove Company

The Michigan Stove Company, Detroit, Mich., put in effect in the past summer a plan under which all its workmen are given life insurance without cost. The company has taken out the insurance under the group plan, married men being insured for \$500 each and single men for \$250. It is the second corporation to take out such a policy and the first manufacturing company. After a workman has been in the company's employ 30 days his name is put on the list of the insured, there being no cost to him and no medical examination, and when he leaves the company's employ his name is taken off the insured list. The *International Molders' Journal*, commenting on the plan, says: "This form of free life insurance, which does not place the workman under any financial or other obligation, must prove of great practical benefit to the workmen, and it should also prove of direct benefit to the firm by attracting workmen to their plant. From what information can be secured this form of insurance would not in any way interfere with a law providing for workmen's compensation or in any manner release the firm from its obligations to workmen injured or killed while at work, as it is a death and not an accident insurance."

The notice posted by the company in its various departments refers to the matter as follows and it is stated that already a large proportion of the employees have filled out the required blanks:

"The protection of one's family in case of his death is the gravest concern of every true man. The ordinary cost of life insurance, especially in cases of a man near or beyond middle age, is so great as to cause a heavy burden upon his income.

"We have been enabled, under a group plan, to arrange for insurance of all our employees in one of the strongest and best companies in the world.

"After careful consideration, we have decided to furnish on application and continuously maintain for each and every workman in our shops while in our employ, entirely without expense whatever to him, an insurance policy so that in case of death his family will receive immediately the sum of money stated below. The premiums upon these policies will be fully paid and maintained by the Michigan Stove Company without any cost to you, and the insurance will cover every man and boy in our plant who applies for it. It will be divided into two classes, as follows:

"For all married men the amount of the policy will be \$500.

"For all unmarried men and boys the amount of the policy will be \$250.

"In case of death to be paid to your family or relatives if you are in our employ at time of death.

"While the annual expense of carrying this insurance upon all employees will be quite heavy, yet we feel that the protection thus afforded will be highly appreciated by all. No physical examination of any nature will be required. All employees will be accepted and covered by general insurance policy without any exception. A blank form will be given you to fill out. Any further information desired will be furnished by applying to Mr. Callan in superintendent's office.

"We sincerely trust that you and your family will appreciate this action on our part."

Adulterated core-flours were discussed by H. W. Gillett, Aluminum Castings Company, Detroit, Mich., in a paper before the American Institute of Metals, Buffalo, N. Y., September 26. Out of seven lots of flour for core-binders obtained from foundry supply dealers, it was discovered that only two were unadulterated. Ground oyster shells and china clay, the two common adulterants, give a chalky white color to the mixture, but the quickest way, he suggested, to detect adulteration is to place a little of the flour on a glass slide, moisten with a drop of solution of iodine in potassium iodide, which stains the starch of the flour blue and leaves the calcareous or earthy adulterants unstained and conspicuous when viewed through the microscope. If ground oyster shells are present, the addition of hydrochloric acid will cause effervescence.

The Production of "Exothermic Steel"

High Heat Secured by the Use of Silicate of Aluminum—Fuel Economies

Walter O. Amsler, Pittsburgh, has published a leaflet describing "exothermic steel," which is "produced either direct from the ore or from metal already reduced by a heretofore unknown exothermic reaction under the conditions prevailing in the electric furnace. The flux used to produce this exothermic reaction is readily obtainable at low prices." In his description of the process, of which George Fogler is the inventor, Mr. Amsler says that it "depends upon the exothermic reducing reaction between a metallic oxide and a compound silicate of aluminum by which the formation of aluminum oxide takes place. Other reagents are added to intensify or accelerate the action of the aluminum compound in the flux upon the oxygen in the ore or in the metal bath. The usual reagents are feldspar and bauxite, together with a quantity of limestone to make a fluid slag."

A sectional view is given of an "exhaust furnace" such as has been used at the experimental plant at Pittsburgh. It consists of a stack furnace with a water-cooled bosh and provided with a basic lining at the hearth. The products of combustion are drawn off at the top, from which a downcomer leads to a cooling tower, into which the gases are drawn by an exhaust blower. Instead of the usual blast pipes at the tuyeres, oil or gas burners are provided. The function of these burners is to provide heat for starting the exothermic reaction and also to maintain its temperature, should an excess of carbon bring it below the igniting point. The ore is charged at the top through a bell and hopper device while the liquid matte is drawn off at the bottom at intervals. "Instead of using coke to the extent of about 75 per cent. of the ore, but 10 per cent. is required in the charge plus the equivalent of about 15 per cent. of coke in the shape of oil or gas at the tuyeres, or a total of 25 per cent." Of the later stages of the process the author says:

A peculiar property of the process is that no precipitation takes place in the matte furnace as long as fresh gangue is being added from the charge. However, when the matte is placed in the open hearth furnace and brought up to the usual temperature it will swell up into a spongy mass and precipitate the metal. It is then drawn into the ladle and disposed of in the usual way. The open hearth furnace is prepared before it is charged with sufficient carbon to give the desired temper to the metal. The results show that the metal in the bath is more uniform in carbon and other constituents than the open hearth steel as made at present. The metal lies on the hearth as quietly as crucible steel and shows no violent boiling. The unusual quietness of the metal is also apparent when the metal runs into and from the ladle. Piping and segregation of the ingot are practically eliminated. This is to be expected, as it has been kept away from the oxygen of the air and of the flame and is protected by the reducing slag.

A statement of cost of the direct reduction process is given based on \$3.75 per ton for ore, with limestone at \$2 per ton, coke at \$3 per ton, flux at \$8 per ton and oil at 3 cents per gal. This figures out \$12.32 per ton as the cost of exothermic steel in ingots. A typical charge is 100 lb. of ore, 2.5 lb. limestone, 10 lb. coke and 1 lb. of flux. Tests of exothermic steel are said to show unusual toughness in steels of 100 carbon or higher. An elongation of 29 per cent. and a reduction of area of 50.1 per cent. were shown in steel of 112 carbon. The same steel showed an ultimate strength 65 per cent. higher than the elastic limit and a cold bend of 180 deg. around a 1½-in. pin. Mr. Amsler says:

The ability of this steel to meet the requirements of high-duty steels at a cost of manufacture less than that of the present steel will probably solve the rail problem, and many others where high wearing qualities and resistance to shock are necessary. It is not at all unlikely that with structural steels made by this process the allowable fiber stress will be raised from 16,000 to 20,000 lb., with its attendant saving in weight and cost.

* * * The nature of the flux and the process make it particularly valuable in reducing ores not available commercially for the present method. Silicious ores, carbonaceous ores, sulphide ores, etc., are readily reduced to very satisfactory grades of steel. The process is especially well adapted to the recovery of copper and precious metals from low grade or sulphide ores.

American shipyards turned out 32 steel ships in the quarter ended September 30, of 44,312 gross tonnage.

Iron and Steel Electrical Engineers

Annual Meeting at Milwaukee—National Industrial Safety Association Proposed

With all of its discussions colored by the general consideration of the subject of safety, the Association of Iron and Steel Electrical Engineers, meeting jointly with the Cooperative Safety Congress, gave particular attention to the subject of steel mill illumination and electric welding at its Milwaukee convention held last week. The tendency with regard to lighting systems for the steel mill seems to be clearly in the direction of the high power tungsten unit, even to the extent of replacing arc lamps as soon as those in service begin to require repairs. The papers and discussions relative to electric welding and in contrast to oxy-acetylene welding brought out with some distinctness that each had a field of special usefulness, that lack of success in specific welding operations as the welding of cast iron has been due to definite mistakes in the conduct of the work rather than to anything inherent in the process, and that this country is gradually following Germany in the application of welding to a wider field of usefulness.

At the first session on Monday afternoon, September 30, two papers of special interest were presented. The one by A. E. Handy, Otis Elevator Company, on "Blast Furnace Tops" called attention to a new type double-drum full automatic hoist for skip and bell operation to be driven by motor or engine. Although patently of considerable interest, the paper brought out little discussion beyond an expression of opinion regarding the merits of the device. In his paper on "Power Problems in Steel Mills," Wilfred Sykes, Westinghouse Electric & Mfg. Company, East Pittsburgh, discussed the various conditions under which the several types of power equipment are each most suitable.

The New Officers

The annual dinner in the evening was the occasion for a general emphasis of the subject of safety. Dr. Joseph A. Holmes, of the Bureau of Mines, speaking on "Safety and Industrial Efficiency," Dr. Lucian W. Chaney of the Bureau of Labor, responding to the toast, "Industrial Betterment at Home and Abroad" and R. W. Campbell, representing the Illinois Steel Company, dwelling on the company's efforts toward safety in the iron and steel industry, laid common stress not alone upon the economic value and necessity of safeguarding the employee and of improving his physical well-being, but upon the necessity for an altruism in industry that would place upon the employer a large responsibility regarding the welfare of the employee. At this dinner the following officers of the Association of Iron and Steel Electrical Engineers were elected:

President, C. W. Parkhurst, Cambria Steel Company.
First Vice-president, E. Friedlaender, Edgar Thomson Steel Company.

Second Vice-president, O. R. Jones, Youngstown Sheet & Tube Company.

Secretary-treasurer, James Farrington, La Belle Iron Works.

Electric Welding

The afternoon session of Tuesday, devoted to the consideration of electric welding, developed a discussion of particular interest, especially that contributed by George Hills, of the C. & C. Electric Company, Garwood, N. J. The paper on "Arc Welding" by J. F. Lincoln outlined the essentials of making a weld, namely, a proper bringing together of the pieces to be welded, maintaining a welding temperature throughout the operation and allowing for expansion and contraction. The paper also presented a description of the Lincoln arc welder, a direct-current machine. A paper on "Oxy-Acetylene Welding" was presented by M. S. Plumley. Brent Wiley, Westinghouse Electric & Mfg. Company, stated that at their works the oxy-acetylene welder was used for plate work and thin sheets, the plain electric arc for heavier work and castings and a number of welding machines were installed for the general replacement of riveters.

It was pointed out that the difficulty of preserving a welding heat in large masses where the conductivity of the metal is great could be lessened by using a small amount of thermit toward the close of the operation. In

welding cast iron the use of a high-silicon iron was not always sufficient to produce a soft weld, but if in addition a proper amount of ferrosilicon were used a satisfactory weld would almost certainly result. This is true for the operation of building on roll necks and for building up roll passes as well as general cast-iron welding. For the building on of cast-iron roll necks a current of from 500 to 600 amperes at from 70 to 80 volts was recommended. It was also maintained that cast iron under shrinkage strains could be welded equally as well as cast iron in compression. The welding of manganese steel to roll necks was also recommended as good practice, even though a greater wear on the coupling boxes resulted.

Mill Lighting

The main points brought out on the lighting question were as follows: The development of the tungsten lamp for industrial lighting has been exceedingly rapid. The improvements in the lamp itself have been paralleled by the evolution in the reflectors. Thus far progress has resulted almost entirely from the laboratory investigations of the lamp manufacturers and the mill engineers, electrical included, have been content to accept the results without going into an analysis of the science of efficient lighting. This situation is changing. The engineer is now investigating his own problems of light distribution with reference to foot-candles, lumens, horizontal areas, shadows and reflections and is seeking the instruments and means for doing so in the daily routine of the mill.

Safety and Welfare

The Friday session was held jointly with the Cooperative Safety Congress. A paper on "Dynamic Braking," by R. D. Davenport, Carnegie Steel Company, New Castle, Pa., was read. The common inefficiency of mechanical brakes on cranes and the dangers resulting from overwinding due to ineffective limit stops offer an important field for improvement in the interests of safety. The paper presented the possibilities of dynamic braking and the discussion indicated a confidence in the efficiency of this method of control provided the shop discipline is such as to prevent employees rendering the brakes or limit stops inoperative by blocking out switches.

R. J. Young, in charge of safety for the Illinois Steel Company, gave an illustrated description of the efforts toward instructing the foreigner in self-preservation; Dr. W. O. Sherman, chief surgeon Carnegie Steel Company, urged the necessity of competent surgical attendance and equipment in industry, and presented striking figures showing the beneficial results of proper medical attention promptly given. In the afternoon Dr. Thomas Darlington of the welfare committee of the American Iron and Steel Institute presided. By means of lantern slides he presented phases of welfare work at the mills, furnaces and mines and in the settlements of foreign employees. His viewpoint in the endeavor to improve the condition of the working masses is not limited to the economic phases, but, as he pointedly brought out, includes a fundamental moral obligation on the part of those who control the industry so to do.

Movement Toward National Safety Society

A resolution adopted by the Association of Iron and Steel Electrical Engineers and looking toward a permanent national organization for the promotion of safety was considered by the Cooperative Safety Congress with the following conclusions:

1. That a new organization along lines similar to existing organizations which make the subject of safety in industry a part of their program is inexpedient.
2. There is need and opportunity for a coordinating body of very simple organization which shall serve for future congresses and safety exhibits the same as the electrical engineers have served in the present case.
3. That your committee will undertake to act as such a National Council for Industrial Safety, adding to its number from time to time representatives of such other bodies as concern themselves with its problems.
4. That the National Council will begin at once to formulate plans for a 1913 congress in conjunction with the Association of Iron and Steel Electrical Engineers.
5. That consideration shall at once be given to the promotion of an international congress on industrial safety at the Pacific Panama Canal Exposition in San Francisco in 1915.

The Machinery Markets

The one conspicuous feature of the machinery trade of the country is the unanimity with which all manufacturing and selling centers report conditions as steadily holding good. In New York there has been little change and the outlook is as encouraging as ever. A general improvement is noted in Philadelphia where special machinery in particular is in great demand. The trade is prosperous nearly everywhere in New England and the call there for special machinery is necessitating extension of time for deliveries. The Cleveland market is very active with nearly all plants operating to full capacity and an especially notable demand for cranes. The jobbing foundries in Cincinnati are operating to 75 per cent. of capacity as against 60 per cent. two months ago, while machinery manufacturers report business steady. Detroit has experienced better buying from the automobile makers and others, with prospects plentiful. Some railroad orders have been placed and more are expected in Chicago, where local business has been satisfactory and some good sales of large tools have been made. A marked improvement is shown in the Central South, with power machinery moving briskly. In Birmingham the demand has been extra good for hoisting machinery and pumps, while general conditions are satisfactory. Although no large lists have reached the St. Louis market conditions there conform with the general situation. Orders for irrigation machinery are exceeding all records for the season in Texas. The Pacific coast is awaiting orders against the recent list of the Western Pacific Railroad and in that territory contractors' equipment continues the main seller, with occasional orders from the mining interests.

New York

NEW YORK, October 9, 1912.

The machinery houses whose activities radiate from New York City continue to enjoy an excellent volume of business and new inquiries indicate a continuance of present conditions. The bulk of the buying is of a miscellaneous character and few big lists are coming before the trade. The long expected list of requirements known to be in preparation by the Baltimore & Ohio Railroad has not appeared but is resting in the hands of one of the higher officials of the company. The Pennsylvania Railroad is a frequent purchaser of a few tools at a time for its Eastern shops and is so adding to its equipment in a quiet way. The trade generally anticipates the closing this month of the large list recently put out by the General Electric Company. Reports are revived that the New York Central & Hudson River Railroad is to again come into the market for an extensive list of shop equipment which has been figured on at least twice before by manufacturers and dealers—but never closed. Several turret lathe manufacturers and dealers are after the business of the Harrisburg Pipe & Pipe Bending Company, Harrisburg, Pa., which is in the market for four or five machines of large size which it is expected will be ordered this month. With some firms the difficulty of making prompt deliveries has lessened a little, especially with some types of tools, although others find that they are getting further behind rather than catching up and they are still asking for extensions of time.

The Department of Water Supply, Gas & Electricity of the city of New York is asking for bids to be opened October 16 on furnishing and installing a steam engine driven fan blower and appurtenances complete in the 179th street pumping station, Borough of Manhattan. Security of \$800 is required and further information may be obtained at the office of the department, 21 Park Row.

The American Machine & Foundry Company, 346 Carroll street, Brooklyn, N. Y., has acquired a site, 100 x 700 ft., on the north side of Fifty-sixth street and First avenue. This site is in the Bush Terminal section and the location will permit of the building of a railroad switch through the property. Plans are now being prepared for a three-story factory building to be erected on the plot.

The S. H. Burns Company of Brooklyn, N. Y., manufacturer of jewelry, has completed arrangements for the moving of its plant to Belmont, N. Y., where it will erect a steel and concrete factory building.

The Board of Village Trustees, Freeport, N. Y., is receiving bids for additions and improvements to the water and electric light plants, including a Corliss engine, two boilers, a 300-kw. three-phase, 60-cycle generator, exciter, switchboard, etc.

The S. Howe Company, Silver Creek, N. Y., manufacturer of grain cleaning machinery, will build and equip an addition to its plant 70 x 75 ft., four stories.

The Fabrikoid Works, Newburgh, N. Y., manufacturer of imitation leathers, is having plans completed for three additional factory buildings to be erected at its plant on South Plank road.

The Fulton Machine & Vise Company, Lowville, N. Y., is about to let contract for the erection of its new foundry.

The Cranshaw Carpet Company, Newburgh, N. Y., is receiving bids for a small addition to be made to its factory.

The London Machinery Company, 344 Broadway, Albany, N. Y., has let a contract for the erection of a warehouse 88 x 106 ft. and 75 x 106 ft., one-story, at Bridge street and Broadway.

The Phoenix Horseshoe Company, Poughkeepsie, N. Y., will build a punch shop 80 x 150 ft., one-story, of steel construction. Contract will soon be awarded. The Lackawanna Bridge Company, Buffalo, was low bidder.

F. Hart, Lansing avenue, Poughkeepsie, N. Y., is receiving bids for a factory building 60 x 150 ft., one-story, from plans of Architect P. M. Lloyd.

The Oneida Company, Ltd., Oneida, N. Y., will erect and equip a new factory building and make other additions and improvements.

The United States Light & Heating Company, Niagara Falls, N. Y., is taking bids for a boiler house 40 x 60 ft. to be added to its plant this fall.

The Monarch Knitting Company, Niagara and Massachusetts streets, Buffalo, N. Y., has purchased a site at Doat street and the Erie Railroad, and will at once erect and equip a factory building 50 x 200 ft., four stories and basement. A spinning mill, dye house, etc., will be built later.

The McKinnon Dash Company, Buffalo, has let contracts for the building of an addition to its plant at Amherst street and Military road.

The Husted Milling Company, Buffalo, will build an addition 100 x 153 ft., two stories and basement, to its grain elevator and feed mill plant at Elk street and the New York, Chicago & St. Louis Railroad.

The Watson Paper Company, Erie, Pa., will build a still house of steel construction at Peach and Sassafras streets and the Lake front. The contract has been awarded.

New England

BOSTON, MASS., October 8, 1912.

Prosperous business prevails practically everywhere in all lines of manufacturing. It is noticeable, however, that builders of some of the standard machine tools of the older types still find their market slow to respond. However, their customers are busy and the demand for increased equipment should soon extend to include all classes of machinery. With the more special lines deliveries continue to recede into the future. Builders of special machinery are exceedingly busy and their customers will soon have to face long waits before their orders can be filled. The Boston & Maine Railroad is buying some machinery, but the list for the North Billerica shops is not out.

The business of the Mark Flather Planer Company, Nashua, N. H., manufacturer of metal planing and shaping machines, has been reorganized as the Flather Planer & Shaper Company. E. J. Flather is the president, Herbert L. Flather the treasurer and F. A. Flather chairman of the board of directors.

The Knox Automobile Company, Springfield, Mass., has made an assignment for the benefit of its creditors to Edward O. Sutton and Harry G. Fisk. The intention is to continue the business at a reduced expense.

The Morgan Motor Truck Company, Worcester, Mass., has been petitioned into bankruptcy by creditors, and George A. Gaskill, Worcester, has been appointed trustee.

The Henry & Wright Mfg. Company, Hartford, Conn., manufacturer of sensitive drilling machines, has begun the construction of an addition to its shops, 35 x 160 ft., one story. The company recently moved into its new works, which afforded increased manufacturing facilities, but the demands of the trade compel another almost immediate addition.

The Baird Machine Company, Bridgeport, Conn., has tentative plans for the extension of its main machine shop building, which will probably be undertaken next spring. The new shops, which have been occupied but a few months, gave double the capacity of those at Oakville, but increasing business has made much larger facilities imperative. The shops have been running 23 hours a day for four months. The company manufactures automatic machinery, presses and tumbling barrels.

The Whitney Mfg. Company, Hartford, Conn., manufacturer of chains and machine tools, has awarded the contract for its new factory building, which will be 48 x 180 ft., two and three stories, of brick and concrete. A large part of the new space will be devoted to the manufacture of silent running chain. The company states that it has no list of requirements, but will add to its equipment from time to time.

The plant and equipment of the James H. Roberts Company, Newfields, N. H., will be sold at auction October 10.

Philadelphia

PHILADELPHIA, PA., October 8, 1912.

Manufacturers of machinery and tools are generally better engaged and orders are becoming more numerous, particularly for the medium and smaller types of tools. Many builders of special machinery are operating close to full capacity. Some tool buying by railroads in this district is expected to develop at an early date. Numerous negotiations for overhead electric traveling cranes are pending. Merchants report their inability to obtain deliveries on a number of makes of machine tools as freely as they could a short time ago and anticipate difficulty in making satisfactory deliveries if prospective buyers defer purchases for any length of time. The export trade in machine tools has been light. Merchants report a fair volume of business in second-hand tools; boilers and engines have also been in fair demand. Increasing activity is noted in the foundry trade.

The Brown Knitting Company, hosiery manufacturer, is adding a one-story addition, 50 x 250 x 49 x 100 ft., to its factory at Hancock and Westmoreland streets. Considerable knitting machinery will be installed when the addition is completed.

R. J. Coleman, for several years connected with the branch office of the Ames Iron Works at Philadelphia, Pa., has become associated with the Mickel-Milnor Engineering Company, 820 Drexel Building, engaged in furnishing and erecting tanks and steel construction, radial brick chimneys, Corliss engines, etc.

The William Steele & Sons Company is taking sub-bids for the construction work of an eight-story fireproof warehouse, 155 x 297 ft., to be built at Tenth and Berks streets for N. Snellenburg & Co.

The Schuylkill Forging Company is engaged in moving from Brainbridge street and the Schuylkill River to its recently completed plant at Pike and American streets, where it expects to be in operation by the end of this week. Considerable new equipment has been installed and further purchases are contemplated later.

The Carvan Construction Company is reported as having the contract for the erection of the new factory buildings for the Voltax Paint & Varnish Company to be built at Hillcrest-Nelson, Montgomery County, Pa.

John G. Brown, engineer, Witherspoon Building, has a contract for remodeling the foundry plant of the American Malleable Company, Buffalo, N. Y. The building will have a 100 ft. addition, while the present wooden construction of the old foundry is to be replaced by brick, making a fireproof building. Changes will also be made whereby the efficiency and output of the plant will be materially increased.

Announcement is made of the incorporation under New Jersey laws, of the Twentieth Century Steel Company, with a capital stock of \$225,000, to engage in the manufacture of iron and steel products. Incorporators

named are E. W. Sterner, William P. Felix, Samuel Hassell, John E. Spotts and John A. Schultz, all of Williamsport, Pa.

Chicago

CHICAGO, ILL., October 8, 1912.

A very satisfactory number of sales were closed in the past week by local machinery dealers. The list of tools upon which the Illinois Central Railroad recently took prices, aggregating a total of nearly \$20,000, was distributed among Manning, Maxwell & Moore, E. L. Essley Machinery Company and Marshall & Huschart Machinery Company. The list included heavy lathes, vertical turret lathes, two radial drills, an engine lathe, bolt cutter and miscellaneous items. In particular contrast to a period of several weeks preceding, sales from the floor were decidedly brisk. An Iowa manufacturer of car underframes bought several tools, including two radial drills, a 42-in. planer and a slotter. Considerable activity in the Milwaukee district is noted and at Chicago the purchase of a large Libby turret lathe by a maker of gears was a matter of general interest. It is understood that the Chicago, Rock Island & Pacific Railroad will place its orders for the tools upon which prices have been recently taken this week. In addition to its previous list, the Chicago, Milwaukee & St. Paul Railroad is asking quotations on additional machinery as follows:

Two 3000-lb. steam hammers.
Two oil burning forging furnaces.
One 36-in. x 18-ft. lathe.
One 42-in. car wheel lathe.
One 20-in. turret lathe.
One 24-in. x 12-ft. traveling head shaper.
One heavy double axle lathe.
One 16-in. turret brass lathe.
One 1½-in. forging machine.
One 30 x 30-in. x 8-ft. planing machine with three heads.

Howard H. Crawford, general manager of the K-R-I-T Motor Car Company, 1466 South Michigan avenue, Chicago, is having plans prepared for the erection of an addition to the company's plant.

L. E. McGann, Commissioner of Public Works, 406 City Hall, Chicago, will receive until October 15 sealed proposals for four steam turbine centrifugal pumps, auxiliaries and appurtenances, each unit to have a capacity of 25,000,000 gal. against a head of 130 ft., steam to be supplied at 145 lb. pressure.

The Lambert Car Mfg. Company, Chicago, has purchased the old power plant of the Chicago City Railways Company, comprising the entire block bounded by Leavitt street, Oakley avenue and Forty-eighth street and Forty-ninth street, on which site a factory is to be erected in the near future.

The Scientific Railway Appliance Company, 4643 North Forty-sixth avenue, Chicago, has been incorporated with a capital stock of \$50,000 to manufacture and sell railroad appliances. The incorporators are Oscar Johnson, James Ingemanson and George L. Chindahl.

The Chicago, Rock Island & Pacific Railroad, through A. T. Hawk, architect, 139 West Van Buren street, Chicago, is taking bids on a one-story machine shop to be built at Manley Junction, Iowa. The building is to be of structural iron and brick.

The Batterman Blower Company, Chicago, has been organized with a capital stock of \$5,000 to manufacture and deal in heating and ventilating apparatus. The incorporators are F. W. Batterman, H. E. Batterman and B. G. Nelville.

The Rockford Novelty & Fixture Company, Rockford, Ill., has increased its capital stock from \$5,000 to \$25,000 to take care of its growing business and the possible erection of a new plant in the spring.

The Forbes Malleable Iron Works, Rockford, Ill., is enlarging its plant by the erection of two additions.

The Reynolds Pattern & Machine Company, Moline, Ill., recently incorporated for the manufacture of gear hobbing machines and automatic screw drivers, is contemplating an extension to its present factory building.

The Rockford Motor Truck Company, Rockford, Ill., has been organized with a capital stock of \$10,000 for the manufacture and sale of electric and gasoline motors. Incorporators are P. A. Peterson, Levin Faust and John Ledin.

The Chicago, Rock Island & Pacific Railroad is making extensive plans for the erection of a large roundhouse and repair shops at Des Moines, Ia., where a site has been purchased.

The Fairmont Machine Company, Fairmont, Minn., has begun work on its new foundry building, which is to be of steel, brick and concrete construction.

The R. L. Kenyon Company, Waukesha, Wis., has filed an amendment increasing its capital stock from

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Mechanical and Civil Engineers,

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\$100,000 to \$200,000. The company builds power boats and auto tops.

The Brunet Falls Mfg. Company, Cornell, Wis., has filed an amendment increasing its capital stock from \$1,000,000 to \$2,000,000.

The Chain Belt Company, 736 Park street, Milwaukee, Wis., has let contracts through Leenhouts & Guthrie, architects, for a concrete, brick and steel addition to its factory.

The Wallis Tractor Company, Racine, Wis., has been incorporated with a capital stock of \$800,000 for the manufacture of tractors. The incorporators are H. M. Wallis, W. C. Quarles and Mackey Wells.

The La Fayette Zinc Company, Benton, Wis., has been organized with a capital stock of \$10,000 by William F. Meeks, Charles E. Freckel and Belle Quinlan.

The Sta-Rite Engine Company, which recently removed from Racine to La Crosse, Wis., is contemplating the erection of a larger plant in the near future.

Detroit

DETROIT, MICH., October 8, 1912.

Reports from the machinery trade indicate a betterment in the volume of business in the past week and the totals have been good. Moreover, there are plenty of prospects for future business in sight, inquiries showing an increase. A considerable amount of equipment will be installed by the Michigan Central Railroad in the new additions being erected to its shops in Jackson, Mich., and the automobile manufacturers are purchasers of a good deal of miscellaneous equipment. The demand for second-hand machinery is quite active. Woodworking equipment is rather quiet with the exception of sawmill supplies, which are selling well. The demand for power-plant equipment is being well sustained. Iron and steel casting plants are busy, some plants being considerably behind in their orders.

The Ross Young & Machine Company, Detroit, has purchased a site on Jefferson, Woodbridge and Dougall avenues, on which it will erect a modern three-story machine shop.

The Detroit Carriage Company, Detroit, will erect a new boiler house and dry kiln.

The Detroit United Railway, Detroit, is preparing to erect extensive carhouses at Flint, Mich.

The Metropolitan Mfg. Company, Detroit, has been engaged in the general foundry business with a capital stock of \$1,000. The incorporators are Arthur E. and Ralph England and Charles Fritz.

The Wolverine Castings Company, Detroit, has been incorporated with \$10,000 capital stock by William Berg, Harry Norrie and John Galen to carry on a foundry business.

The C. M. Hall Lamp Company, Detroit, manufacturer of automobile lamps, has taken out a building permit covering the erection of a two-story addition to its plant, to cost \$17,000.

The Home Electric Stove Company, Detroit, has been incorporated with \$50,000 capital stock to manufacture electric stoves and other electrical appliances. The stockholders include Wirt I. Savery, Walter J. Vaughn and John H. Holmes.

The M. & P. Electric Vehicle Company, Detroit, automobile manufacturer, has increased its capital stock from \$50,000 to \$100,000.

The Continental Motor Mfg. Company, manufacturer of automobile engines, operating plants at Detroit and Muskegon, Mich., has filed notice of an increase of capital stock from \$500,000 to \$2,400,000.

The Detroit Interior Finish & Mfg. Company, Detroit, has been incorporated with \$50,000 capital stock to manufacture a line of wooden articles. George J. Murdock is the principal stockholder.

The Rands Mfg. Company, Detroit, manufacturer of automobile parts, has acquired a factory building at Fort and St. Antoine streets, and will install new equipment and operate it as an addition to its present plant.

The village of Saline, Mich., has voted to bond for \$30,000 to provide for the construction of a water-works plant.

The Ypsilanti Reed Furniture Company, Ionia, Mich., has completed plans for the erection of a new factory building to be 60 x 400 ft., four stories. The estimated cost, with equipment, is \$100,000.

W. W. Butterfield and associates, Muskegon, Mich., have organized a company to manufacture a self-starting device for automobiles. The new company has completed negotiations for a factory building.

Chester F. Leathers, Edward J. O'Neill and others, of Kalamazoo, Mich., have organized a company for

the manufacture of a burner which generates gas from oil fuel. The company plans to eventually add the manufacture of furnaces adapted to the use of the apparatus.

The Fox Typewriter Company, Grand Rapids, Mich., is negotiating for a factory site in Kalamazoo, Mich. The company will build on a larger scale and will add other lines to its manufactures.

W. H. Kilto & Son, Toledo, Ohio, will remove their automobile factory to St. Louis, Mich. A company has been incorporated with \$25,000 capital stock to take over the business and a new factory building will be erected at once.

The Marshall Butters Lumber Company, L'Anse, Mich., will erect a sawmill having a daily capacity of 200,000 ft. A shingle mill will also be constructed.

Plans are being prepared for the manual training school recently authorized at Menominee, Mich. The building will cost \$30,000 and will be equipped for forge, foundry and machine shop practice.

Harry G. Miller, Alma, Mich., is interested in the formation of a new company for the manufacture of an automatic press feeder.

The Lufkin Rule Company, Saginaw, Mich., is preparing to build a large addition to its plant.

The Walker-Weiss Axle Company, Flint, Mich., has been incorporated with \$150,000 capital stock by Fred J. Weiss, W. Thomas Walker and Charles H. Bonbright. The new company will take over the plant and business of the Flint Axle Works and will enlarge its capacity.

The Independent Power Company, Holly, Mich., has begun the construction of a power plant at Linden, Mich.

The Charlotte Mfg. Company, Charlotte, Mich., furniture manufacturer, has completed negotiations for a new factory building, which will enable it to materially enlarge its operations.

Cleveland

CLEVELAND, OHIO, October 8, 1912.

The demand for machine tools continues very active. While buying in the week was nearly all in single tools the aggregate business was large. Practically all manufacturing plants are running at full capacity and many find the need of additional equipment. Some plants that a few weeks ago were running at less than full capacity are now being operated overtime. Not a great deal of business is coming from the railroads, orders from that source being confined mostly to single tools. Second-hand machinery is moving fairly well. The demand for cranes is good, both for small installations and for heavy equipment for steel plants. There is a good volume of inquiry out from the latter source, both for cranes and other steel plant equipment. The demand for steam and gas engines is fair, having improved recently. Local makers of twist drills report a heavy volume of business.

The Northern Ohio Traction & Light Company, Akron, Ohio, has a machinery list out for its shop at Cuyahoga Falls, Ohio, which, in addition to forges, small tools, etc., includes the following:

- Three 18-in. revolving jib cranes.
- One 24-in. belt-driven shaping machine.
- One 10 x 15-in. power hack saw.
- One 26-in. x 18-ft. quick-change, 3-step cone engine lathe.
- One 20-in. upright drill, complete.
- One 200-lb. Beaudry power hammer.
- One 20-in. x 10-ft. pattern makers' lathe.
- One combined disc and drum sanding machine.
- One heavy mortising machine.
- One single spindle wood shaping machine.
- Two 5-ton chain hoists.
- One 3-ton portable crane.
- Two 1-ton portable cranes.
- One planing, matching and molding machine.
- One universal saw table.
- One No. 5 steel pressure blower.

The Upson Nut Company, Cleveland, has an inquiry out for several cranes for its new forge shop, and the following list of machine tools:

- One 48-in. vertical boring mill.
- One 16-in. lathe.
- One 24-in. lathe.
- One 60-in. radial drill.
- One 16-in. shaping machine.
- One 24-in. shaping machine.
- One 900-lb. steel hammer.

The McNaul Boiler & Mfg. Company, Toledo, Ohio, has finished the erection of a new plant on Front street at the foot of East Broadway and will shortly be located in its new quarters. The new building is 70 x 240 ft. and is well equipped with machinery and electric cranes. It provides a much larger capacity than the company's old plant.

The Nailler Company, Elyria, Ohio, has been incorporated with a capital stock of \$1,000,000 by R. F. Nailler and others to erect a large plant in that city for the manufacture of enameled products. It is the intention of the new company to manufacture a number of lines of both smaller and larger apparatus than are now made by the Enameled Pipe & Engineering Company, Elyria, Ohio, of which Mr. Nailler is president and general manager.

A new sheet metal working shop will be erected in Cleveland by F. C. Thornton. The building will be 72 x 170 ft., two stories and basement, and will be located on Union avenue, S. E., near East Sixty-eighth street. Some new sheet metal working equipment will be required.

The Cooper Spring Company, Cleveland, will build a new plant at 1241 Winslow avenue. The building will be 79 x 85 ft., one story, of brick and steel construction.

The Herbrand Company, Fremont, Ohio, will enlarge its plant by the erection of a two-story building, 72 x 45 ft., which will be used as a machine shop.

The B. & M. Screw Company, Fostoria, Ohio, has been incorporated with a capital stock of \$10,000 by K. M. Carr, E. B. Pillers, C. B. Howell and others.

The American Iron & Tin Products Company, Cleveland, has been incorporated with a capital stock of \$100,000 by George W. Crossette, Robert S. Hamilton, C. A. Schlup, Roy Young and S. S. Kail.

Wolf Brothers are buying machinery for a new machine shop that they will operate at 4624 Detroit avenue, Cleveland.

Cincinnati

CINCINNATI, OHIO, October 8, 1912.

A very encouraging feature in the Central West is the activity of jobbing foundries, and especially those dependent on the machine tool builders for the bulk of their business. A careful estimate shows them as operating to about 75 per cent. of capacity, as against a generously estimated average of 60 per cent. two months ago, and a few foundry operators have sufficient work on hand to make them very indifferent about taking on any new business.

Machine tool builders report business as being steady, with the majority of orders calling for single tools, and confined to no particular part of the country. Although there are a number of large railroad lists out, buying against them is slow.

The second-hand machinery dealers are enjoying a better trade, and manufacturers of electrical equipment continue making good reports.

The Board of Education, San Diego, Cal., has issued an extensive list of machine tools wanted, included in which are the following lathes that are being bid on by local firms:

- Two back-geared, 12-in. x 6-ft. screw cutting engine lathe, with 2 hp. motor.
- One 11-in. x 4-ft. screw cutting engine lathe, with 2 hp. motor.
- One 20-in. x 10-ft. screw cutting engine lathe, with 5 hp. motor.
- One 16-in. x 12-ft. screw cutting engine lathe, with 3 hp. motor.

The Cincinnati Planer Company, Oakley, Ohio, reports the month of September as being the best in the history of its organization, and with the larger percentage of its orders coming from domestic customers.

A large amount of structural steel, heating, lighting and other equipment will be required for the proposed Hamilton County Court House, to be erected on Main street, Cincinnati. Selection of architects for the new structure will be made within the next few days.

The Cincinnati Ice Company, Cincinnati, will erect an ice plant in East End, for which ice-making machinery and a power plant will be required.

C. W. Handman, business manager Board of Education, Cincinnati, will open bids October 21 for 380 metal lockers, size 12 x 12 x 48 in., to be installed in a public school building.

The Buckeye Equipment Company, Cincinnati, manufacturer and dealer in electrical equipment, has increased its capital stock from \$5,000 to \$10,000, and will add to its present manufacturing facilities.

The John J. Radel Company, Cincinnati, has let contract for a two-story reinforced garage building, to contain a small repair shop, for which a few machine tools will be required.

Among recent foreign orders received by the Rahn-Larmon Company, Cincinnati, is one for two large gap lathes to be shipped to Ceiba, Spanish Honduras.

J. T. Moorman, Indianapolis, Ind., successful bidder for the collection and disposal of garbage in Cincinnati, is having plans prepared for a large garbage disposal plant, for which considerable equipment will be needed.

The Universal Bolt & Nut Lock Company, Newport, Ky., has increased its capital stock from \$50,000 to \$75,000, and will increase its output of a recently patented nut lock.

Rauh & Rauh, Cincinnati, recently incorporated, will soon be in the market for small electric motors and other special equipment to be installed in a large shirt factory the firm intends erecting.

The Braddock & Burns Foundry & Machine Company, Wheeling, W. Va., has been incorporated with \$50,000 capital stock by W. J. Braddock, C. A. Burns and others.

The Egry Register Company, Dayton, Ohio, is erecting an addition to its plant that will greatly increase its output.

Among recent orders received by the Triumph Electric Company, Oakley, Ohio, is one from the Lima Locomotive Corporation, Lima, Ohio, for seven direct-connected, reversing planer motors, ranging from 25 to 60 hp.

The Standard Bolt & Forging Company, Columbus, Ohio, has been incorporated under the laws of West Virginia to manufacture bolts, castings, etc., by H. E. Vance and others, of Columbus. Nothing is yet known as to manufacturing plans.

The Hess Spring & Axle Company, Carthage, Ohio, a Cincinnati suburb, is asking for estimates on a mechanical heating system to be installed in an addition to its plant, recently completed.

The Central South

LOUISVILLE, KY., October 8, 1912.

Business in all lines is showing marked improvement, and the machinery trade is accordingly being benefited. The general feeling is more optimistic than it has been for several months. Not only are inquiries being received in larger number, but actual orders have been placed liberally by buyers, who have evidently decided that a bumper corn crop will be more effective in determining business conditions than a presidential election. Power machinery, which after all is the barometer which indicates whether manufacturers are busy or otherwise, is moving briskly, and makers of boilers, generators, motors, etc., are having plenty to do both in the manufacturing and sales departments. Active building continues, and a good many contracts for work of that kind have been awarded.

L. P. Weatherby, Middletown, Ky., a suburb of Louisville, is president of the Middletown Ice & Cold Storage Company, which has been organized with \$15,000 capital stock. It will erect an ice factory in the immediate future, if a sufficient water supply can be located.

The International Steam Pump Company has located its Louisville offices, having charge of sales in Kentucky and Tennessee, at 204 Keller Building. H. B. Placke is Louisville sales manager, reporting to George W. Galbraith, manager of the Cincinnati office. The local office has sold a 6000-cu. ft. low-pressure air compressor to the Standard Sanitary Mfg. Company for installation in its Louisville plant, and a 4000-cu. ft. low pressure compressor to the same company for installation in its New Brighton, Pa., plant. The Standard Sanitary Company will erect an addition to its Louisville power-house to take care of the compressor. It will also build a two-story brick addition for the storage of patterns.

The Henry Vogt Machine Company, Louisville, reports excellent business in its boiler department, a number of important contracts having been closed recently.

The Coral Ridge Clay Products Company, Louisville, Ky., is organizing and will install a brick plant at South Park, a suburb. Common building brick will be made by a patented quick-burning process. W. D. Roy is one of the principal members of the company. The designing of the plant and the purchase of equipment are in the hands of the Trautwine Drier & Engineering Company, Chicago. The machinery thus far purchased includes three 72 in. x 18 ft. high-pressure boilers manufactured by the Henry Vogt Machine Company, Louisville.

The Yager Motor Car Company, Louisville, is preparing to erect a new garage, a feature of which will be a large and well-equipped machine shop for repair work.

The Kentucky Auto Company, Louisville, will establish a service station at Lexington, Ky. A machine shop for repair work will be equipped. Address Ira S. Barnett.

The Kentucky Overhead Irrigation Company, Louisville, recently incorporated, has established offices in the Realty Building. The company will install irrigation plants of a new type. Pumps and other equipment will be purchased in the open market, while a small shop will probably be equipped in Louisville for taking care of machinery installations.

The Nashville, Chattanooga & St. Louis Railway, with general offices at Nashville, Tenn., has acquired sites at Paducah, Ky., for its new shops and will probably begin work in the near future.

The plant of the Kemp Milling Company, near Hazel Green, Ky., was destroyed by fire last week with a loss of \$10,000. Plans for rebuilding are being considered.

A bond issue of Corbin, Ky., amounting to \$40,000, has been declared valid by the Court of Appeals of Kentucky. The bonds will now be sold and a water-works system for the construction of which the bonds were authorized will be contracted for.

The Kentucky Public Service Company is to install new engines in its power plant at Bowling Green, Ky. Address General Manager Fitch.

The Hopkinsville Water Company, Hopkinsville, Ky., is planning to issue bonds for the purpose of making improvements. New equipment will be installed at the pumping station.

The Norris Roller Mills, Morgantown, Ky., were burned last week, the loss being \$15,000. B. E. Norris is owner of the plant, which will probably be rebuilt.

The Battey Machinery Company, Rome, Ga., is in the market for a used bolt-cutter and a pipe-cutting machine.

The Elk Motor Truck Company, Charleston, W. Va., is in the market for a used engine lathe. The size desired is from 16 to 20 in.

The R. D. Hughes Nut Lock Corporation, Lynchburg, Va., is completing preparations for the establishment of a plant to make nut locks. The company has \$25,000 capital stock.

A foundry 75 x 150 ft. will be built by the Iron City Stove & Foundry Company, Bristol, Tenn. A finishing department will also be installed. Calvin and Lemuel George are the principal stockholders of the company.

The Partridge Hot Blast Smelter Company, Knoxville, Tenn., will erect a plant shortly after the first of the new year. The company will manufacture smelting and cupola furnaces, and will require machinery for casting, welding and sheet-working. Allen R. Partridge is treasurer of the company.

The veneer mill of the Jackson Lumber Company, Jackson, Tenn., was burned with \$30,000 loss October 1. The loss was covered by insurance, and the company will probably rebuild.

The Aluminum Company of America is reported to be considering the establishment of a plant in or near Knoxville, Tenn. In the event this is done power will be secured from a hydro-electric plant to be built on the Little Tennessee River near Chilhowee. A site for the plant will be given by Knoxville business men, it is stated.

Greeneville, Tenn., is preparing to proceed with the construction of a water-works system, a bond issue for the purpose having been authorized by the State Legislature several months ago.

Louis Beyer, Chattanooga, Tenn., is reported to be organizing a company to build a factory for the manufacture of cedar products.

Birmingham

BIRMINGHAM, ALA., October 7, 1912.

Considerable satisfaction is expressed as to the business transacted by the machinery dealers in the month of September. While, of course, there was a slight deflection from the expected, still there was a steady demand with improvements being made at coal mines, saw mills and from contractors on railroad construction. At least half a dozen new coal mines are being developed in Alabama at present and there is need for pumps and other machinery. Some advantage is being taken of the time being lost in the operation of mines and mills because of the railroad car shortage and additions to the equipment are being put in. Hoisting machinery, as well as pumps and other apparatus find a steady demand in the coal fields in this section, while other machinery and goods are needed elsewhere. Well digging in supposed gas and oil fields in DeKalb County is being started on and in all probabilities will be the cause of some activity in machinery in that part of the state. Foundries and

machine shops in the Birmingham district report a fairly good demand for engines from Louisiana, Cuba, and other sections.

T. L. Long will soon have a fair-sized saw mill located on a tract of several hundred acres of timber lands he recently purchased in Walker County, near Jasper, Ala.

The Tampa Lumber & Mfg. Company, Tampa, Fla., has been incorporated and will establish saw mills in Florida.

A metal roofing plant will be established at Americus, Ga., L. W. Rose and associates organizing a company for the purpose. The concern is to manufacture metal shingles and roofing.

The Miller-Jackson Grain Company, at Tampa, Fla., is preparing to build a grain elevator.

P. N. Anger heads a company which will build a paper mill at Shreveport, La. It will have a daily capacity of 200 tons. The power to be developed by the boilers is 10,000 hp. Shreveport has given a free site. The company will use yellow pine waste in manufacturing paper.

The McWane Pipe Works, Lynchburg, Va., will build a pipe foundry at Anniston, Ala. The main building will be of steel construction, 235 x 115 ft. Electric motors, cupolas and a blower will be purchased.

The Alabama Pipe & Foundry Company, Anniston, Ala., will build a foundry for the manufacture of soil pipe and fittings. A small machine shop will be equipped. Most of the machinery has been bought. W. F. Johnston is president of the company, which has a capital stock of \$30,000.

Bids will be received by the mayor of Morgan City, La., until October 22, for the pumping station to be erected for the municipality. Xavier A. Kramer, Magnolia, Miss., is consulting engineer and has plans.

St. Louis

ST. LOUIS, Mo., October 7, 1912.

Business in the machine tool market in the week has been of satisfactory character, the demand being general as to type of machines wanted and as to the territory from which they came. While no large lists were reported, the volume of business done was excellent in the aggregate. None of the large lists which have been previously reported have been awarded, but that of the Busch-Sulzer Bros.-Diesel Engine Company may be expected at any time. Second-hand machinery is in fair request. Collections are good.

The Anheuser-Busch Brewing Association has begun the construction of a new power plant, a permit having been taken out for a building to cost \$28,000 exclusive of equipment. It is to be supplementary to the large main plant.

Fire in the power plant of the American Pressed Brick Company, St. Louis, October 2, caused \$15,000 damage. The damaged equipment will be replaced.

The S. Pfeiffer Mfg. Company, St. Louis, manufacturing chemist, has begun the construction of a new plant which will double its present mechanical capacity. Elevators, steam-heating plant, smokeless furnace and other equipment will be required in addition to special machinery.

The St. Louis Motor Transportation Company, with \$25,000 capital stock, has been organized at St. Louis, by W. R. and Frank Bush, Knox Taussig, William A. Thomas and Richard S. Locke for the maintenance of a repair shop, which is to be equipped at once, and also to equip hauling devices.

The Charles Valier Company, St. Louis, is completing a grain elevator of 200,000 bushels capacity, which will involve an investment of \$250,000 in equipment and building.

The Piasa Light & Power Company, Alton, Ill., which recently obtained a public service franchise, will begin work shortly, under the direction of John J. Cummings of Chicago, on the erection of a power house to cost, with its equipment, about \$90,000.

The Metal Novelty Company, St. Louis, has been incorporated with \$30,000 capital stock, to manufacture metal novelties, tools, and to do a general machine shop business, by W. F. Sweet, H. C. Beckwith and W. F. Donnell, the latter of Hematite, Mo.

The Famous Laundry Company, St. Louis, with \$16,000 capital, has been incorporated by Selig Feinstein and others and will equip a plant at once.

The Great Western Cleaner Company, St. Louis, has increased its capital stock from \$25,000 to \$35,000 for the purpose of increasing its mechanical equipment.

A plant for the manufacture of cans is to be installed by the Arkansas Tin and Sheet Metal Works, at Prescott, Ark.

The Moonlight Coal Company, of Greentop, Mo., will equip its mining property with machines to handle a three to four ft. vein operated by gasoline power. The president is W. L. Young.

Mixers, grinders, mills and a power plant are to be installed by the Hydrozo Paint Mfg. Company, recently incorporated at Kansas City, Mo., by E. E. Blackman and others, of that city.

A refrigerating plant, to be built by the Bahlan Produce Company, Pine Bluff, Ark., is to be of five compartments, with considerable mechanical equipment to meet needs.

The Simplicity Shade Adjuster Company, Memphis, Tenn., which has offices in the Scimitar Building, will equip a plant with die presses, lathes, electric motors, etc., for the manufacture of its device.

The \$15,000 of bonds recently voted by Rich Hill, Mo., for the construction of an electric light and power plant will be sold October 16, after which arrangements will be completed for the construction of a plant. Bids will be asked for two 150-hp. boilers, two engines, two 150-hp. electric generators and other equipment.

The Economy Water Heater Company, St. Louis, has been organized with \$50,000 capital stock by J. W. Ellebrecht, Leo J. Bayer, F. W. Maury, George E. Booth and A. D. Tibbals to equip a plant for the manufacture of gas water heaters.

The Guin Company, Buckhead, Okla., has had plans prepared by the Murray Gin Company, Dallas, Tex., for the equipment of a plant to cost \$5,600.

The Louisville Light Company, Louisville, Miss., has been granted a franchise and will at once begin the construction of an electric light and power plant.

The plans of the Keystone Driller Company, for a branch plant at Joplin, Mo., are not yet in shape for definite announcements. The main plant is at Beaver Falls, Pa.

The Columbia Oil Company, Lawton, Okla., with \$20,000 capital stock, has been incorporated by Frank Coon, F. M. Harple, M. H. Beddow, of Lawton, and W. F. Deardoff, of Columbus, O., to equip and operate land owned by them.

The Watson Violin Piano Company, Jonesboro, Ark., has been incorporated with \$100,000 capital stock by F. H. Watson, L. H. Fairchild, of New Orleans, and James E. Parr of Jonesboro. A plant is to be equipped for the manufacture of a patented piano.

The Missouri, Kansas & Texas Railway Company will build a roundhouse and necessary machine shop at Mokane, Mo., it is reported, the engineer in charge being S. H. Fisher at the St. Louis offices.

A plant for the manufacture of fruit jars, it is reported, will be equipped at Sand Springs, Okla., by Ball Bros., Muncie, Ind.

It is reported that the Fredonia Glass Company, Coffeyville, Kan., will equip a glass plant of 36-blower capacity at Okmulgee, Okla., within the very near future.

The Imperial Soap Company, Oklahoma City, Okla., will increase its capital stock to \$50,000 and enlarge its mechanical equipment.

The Oklahoma Bottle & Glass Company, Blackville, Okla., has been organized by E. K. Sheller, George C. Crawford, Robert Ballentine, J. B. Robison and E. B. Ballentine and will equip a plant at once.

The Biery Pine Products Company, Covington, La., with \$50,000 capital stock, has plans for the construction and equipment of a plant for the extraction of turpentine, tar, rosin, etc., from pine stumps. The active men are Henry P. Pruden, C. E. Schonberg and M. C. Day.

The Warren Automobile Company, St. Louis, recently incorporated, has completed arrangements for the construction of a building to be equipped as a repair shop as well as garage.

The Skinner Bros. Mfg. Company, St. Louis, with \$25,000 capital stock, has been incorporated for the purpose of equipping a plant for the manufacture of exhaust and ventilating fans and dust collecting apparatus. The incorporators are Charles N. Skinner of New Orleans, La.; Daniel B., Fred A. C., and Merrill G. Skinner.

J. B. Henly, Florence, Ark., has plans for the establishment of a syrup mill, and will require engines, boilers, evaporators, etc. The capacity of the mill has not yet been determined.

The Whitcomb Cabinet Company, Kansas City, is planning the erection of a new factory at 1404 Chestnut street, to cost \$14,000. The building will be of reinforced concrete.

Indianapolis

INDIANAPOLIS, IND., October 8, 1912.

The Superior Court of Indianapolis has appointed Elmer Wetzel receiver for the Hoosier City Boiler Company. James I. Stephenson and James A. Sebastiani incorporated the company with \$100,000 capital stock; buying the plant from James G. Quinlan, who applied for the appointment of a receiver.

The Excelsior Mfg. Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture horseshoes. The directors are Frank F. Jacobs, J. Frank Young and Robert E. Woods.

The former receivers for the T. B. Laycock Mfg. Company, Indianapolis, having resigned, the court has appointed George Feeney to succeed them. The company is a large manufacturer of iron and brass beds, springs, etc.

The Columbia Heating Company, Indianapolis, has been incorporated with \$15,000 capital stock, to manufacture heating devices. The directors are H. H. Buckman, Jr., O. M. Ragsdale and L. E. Lathrop.

The Stimson Computing Scale Company, Elkhart, Ind., has changed its name to the Detroit Automatic Scale Company.

The Chambers Mfg. Company, Shelbyville, Ind., has been reincorporated and will continue the manufacture of a recently developed gas range. The reorganization does not imply a change of location nor the erection of a new plant at present, the buildings now occupied being well adapted for the company's needs. Considerable enlargement and improvement in equipment, however, is immediately contemplated and additional machinery for working sheet bar metal will be installed. J. E. Chambers is president; Albert De Prez, vice-president; E. A. Chambers, secretary-treasurer, and J. M. Martin, manager.

The Sterling Absorber Company has been incorporated at Wabash, Ind., to manufacture vehicle springs. The directors are M. Tillman, C. Huff and J. Kaiser.

Texas

AUSTIN, TEXAS, October 5, 1912.

With the advent of cool weather and the placing in circulation of the money derived from the sale of the cotton crop, much of which staple is being marketed as fast as it is picked, there is a noticeable revival of all lines of industry. It is stated by machinery dealers that orders for equipment of various kinds, especially irrigation pumping plants, are coming in at a more numerous rate than ever known at this season. Almost daily there is a development of plans for the establishment of new enterprises that will require machinery equipment.

The Fort Worth Rolling Mills is installing new machinery and making other improvements to its plant at Fort Worth.

The San Benito Irrigated Land Company has increased its capital stock from \$15,000 to \$250,000. It will construct an extensive system of irrigation in the San Benito section.

The Independent Farmers' Gin Company has been organized at Perry with a capital stock of \$7,500 for the purpose of erecting a cotton gin. The incorporators are O. H. Ludwig, G. A. Bletch and W. H. Smith.

The San Antonio Boiler & Gin Company has been organized at San Antonio with a capital stock of \$15,000. The incorporators are J. M. Wilson, P. C. Ruth and F. C. Ruth.

The Terry Oil Company, Houston, recently organized, will operate in Texas oil fields. The incorporators are Frank Clemenger, W. Y. Fuqua, John Lovejoy and F. J. Hardy.

It is reported at Alpine that the Southern Pacific Railroad Company will establish shops at that place for joint use with the Kansas City, Mexico & Orient.

It is reported that the Missouri, Kansas & Texas Railroad will move its shops and terminals to a point beyond the city limits of Houston, where it has purchased a tract of 49 acres of land situated between Cottage Grove and Eureka.

The Mutual Oil & Gas Company, Wichita Falls, has been organized with a capital stock of \$150,000 for the purpose of operating in the Electra and Petrolia oil fields. The incorporators are J. E. Alexander, P. J. Duffy, W. J. Schuler and others.

Engineer J. M. Bassett is preparing plans and specifications for a new pumping plant that is to be erected at the Union hospital at Dallas for the purpose of supplying that institution with water.

Henry M. Wallace of Detroit, Mich., who was recently granted a franchise for the installation of a gas plant and the construction of a distributing system at Corpus Christi, Texas, will soon begin the work of putting in the equipment.

J. R. Potter of Blue Springs, Miss., will install an irrigation pumping plant and construct a system of ditches upon a tract of land he owns near Cotulla.

John H. Lewis of Wabash, Ind., and associates are constructing a system of irrigation upon a tract of land near Cotulla.

Armour & Co., Chicago, Ill., are arranging to install a cold storage plant at Brenham, Texas.

Dr. W. D. Thackeray contemplates installing a large fig preserving plant near Fowlerston.

The Lake Charles Veneer Company will install a plant at Lake Charles, La., for the manufacture of veneer articles, boxes and crates. S. H. Spangler is president.

J. D. Waggoner is preparing to construct a system of irrigation near Stiles.

The Continental Gin Company's plant at Dallas, Texas, sustained a loss by fire of several thousand dollars on September 25, the greatest damage being done to patterns in the foundry and to the transmitting equipment.

The People's Ice Company will enlarge its ice plant at Wichita Falls at a cost of about \$100,000.

The Singer Mfg. Company, Cairo, Ill., will install a large lumber mill and veneering plant near Tallulah, La. This company recently purchased 65,000 acres of timber land adjacent to Tallulah.

J. D. Moody of Eden will establish a large broom manufacturing plant at San Angelo.

The Smith County Co-operative Creamery Association is being organized at Tyler for the purpose of installing a creamery plant.

Bids will be opened upon November 11 for the installation of the new municipal filtration plant at Waco. Plans and specifications have been prepared by N. Werskiöle, engineer, of Dallas. The plant will have a capacity of 6,000,000 gal. of filtered water daily.

The Butler-Elgin Brick Company will rebuild its brick plant at Austin which was recently destroyed by fire. The loss was about \$35,000.

The Mathiesen Spring Cushion Wheel Company, recently organized with a capital stock of \$60,000, will install a plant at San Antonio for the manufacture of spring cushion automobile wheels. The officers of the company are C. W. Duhler, president; H. Mathiesen, vice-president, and H. A. Maruchau, secretary and treasurer.

John H. Davis is installing a machine shop at Miami, Ariz.

It is reported that the American Smelting & Refining Company, which recently obtained control of the Lake Superior and Arizona group of mines near Miami, Ariz., will erect a large smelter upon the property.

The Detroit Copper Company will install two new steel engines and two boilers at its power plant near Morenci, Ariz.

P. A. Lackley of Vega, Tlaxcala, Mexico, will install a plant at that place for the manufacture of fiber goods.

The Pacific Coast

SAN FRANCISCO, CAL., October 1, 1912.

The recent buying movement in machine tools has passed, and the market at the moment is very quiet, with no orders of special importance and few new inquiries. Orders are expected, however, on the Western Pacific Railroad list within the next fortnight, and there is some indication of an early resumption of buying by established shops.

Activity in miscellaneous machinery is well maintained. Electric and hydro-electric equipment promises to be a very important factor in the market during the next year, and some large orders have already been placed. The Pacific Light & Power Company has let its penstock contract, said to be the largest of the kind on record, calling for 3600 tons of lapweld pipe, 24 and 42-in., to stand a working pressure of 2100 ft. of water. The order was placed by George Henry, Jr., engineer, with the Mannesmann Tube Works, Germany, delivery to be completed in seven months. Contracts are also said to have been let for the principal power house equipment. Several other large hydro-electric plants are still to be provided for, though definite inquiries may not come out for some time.

General contractors' equipment remains among the leading features of the market, with occasional orders from mining interests. Inquiries for woodworking machinery are a little more numerous, and considerable activity is expected during the winter.

The Compressed Air & General Machinery Company, San Francisco, has been incorporated with a capital stock of \$150,000, by J. F. Shuman, A. L. Whittle, E. Schwab, F. B. Lorigan and W. H. Smith, Jr.

It is reported that the James Graham Mfg. Company, operating a stove foundry at Newark, Cal., will remove its plant to Richmond, Cal.

Miller & Lux are installing a new planing mill at Dos Palos, Cal.

San Benito County, Cal., has placed an order for a rock crusher with the A. L. Young Machinery Company, this city.

The Granite Rock Company, Watsonville, Cal., is doubling its plant by the installation of a No. 7½ McCully crusher and the largest set of rolls on the coast, with screens and conveyors.

The Corliss Gas Engine Company, Petaluma, Cal., is adding a few tools to its plant.

The Ashland Window Guard Company, San Diego, Cal., intends to change its name to the Gilbert Ornamental Iron Works. The company has taken an option on a four-acre site and proposes to build a new plant.

The town of Woodland, Cal., has let a contract for a new waterworks boiler to the Phoenix Iron Works, Sacramento.

The Venice Planing Mill & Mfg. Company, a new concern, is preparing to install a woodworking plant at Venice, Cal.

The Eureka Sash & Door Company, Eureka, Cal., is preparing to install a lot of new machinery.

The Capital Gas Engine Company is moving its plant from Sacramento to Elk Grove, Cal.

A new hoisting outfit has been ordered for the Gold Point mine, Grass Valley, Cal.

Eastern Canada

TORONTO, ONT., October 5, 1912.

The Canadian Roll & Machine Company, incorporated with a capital stock of \$500,000, proposes to erect and operate a factory in Hamilton, Ont.

The Dain Company's plant at Humberstone, Ont., has been taken over by the Deere Machine Company.

The Northern Navigation Company is putting up a refrigerating plant, warehouse, etc., at Point Edward, Ont.

The Thompson Monument Company is putting up a factory in Toronto.

The Spring Axle Company, Gananoque, Ont., is making alterations in its machine shops and installing machinery for the manufacture of automobile springs.

The D. F. Jones Mfg. Company, Gananoque, Ont., is extending its rolling mill plant.

The Sherbrooke Iron Works Company, Sherbrooke, Que., is adding a foundry, boiler and machine shop to its plant.

The Canadian Ingersoll Rand Company, Sherbrooke, Que., has given the contract for the erection of a machine shop.

The Superior Brick Company, with a capital stock of \$500,000, has been organized to manufacture brick and tile at Fort William, Ont.

S. M. Brookfield & Co., Ltd., Halifax, N. S., have the contract for the erection of the \$1,000,000 sugar refinery at Woodside, N. S., for the Acadia Sugar Refineries.

Among the new incorporations are the Paris Brick and Clay Company, Ltd., with a capital stock of \$100,000 and head office at Brantford; the Guelph Brick & Tile Company, Ltd., with headquarters at Guelph, and a capital stock of \$50,000; and the Thor Iron Works, Ltd., Toronto, with a capital stock of \$100,000.

The Consumers' Gas Company, Toronto, is having a power plant and generating house built.

The Standard Steel Construction Company will erect at Welland, Ont., a large plant that will employ 1200 to 1500 men and have a capacity of 4000 tons of structural steel per month. Forty acres of land have been purchased. Temporary offices are opened and construction will be commenced at once.

The Canadian Consolidated Rubber Company, which is erecting an immense rubber tire plant in Berlin, Ont., has awarded the tender for construction of a reinforced concrete building 91 x 432 ft., four stories, to A. Wallberg Company, of Montreal. The cost of the new structure is estimated at \$300,000.

The Ludlam Ainslie Sash & Door Company, Leamington, Ont., is having plans prepared for a new fire-proof factory building to replace one recently destroyed by fire. New machinery and equipment will be required.

The Chadwick Brass Company, Ltd., Hamilton, has been incorporated with a capital stock of \$800,000, and has plans in contemplation for the erection of a foundry plant. Anthony L. Malone, Frederick L. Whitney and Albert Mearns are the provisional directors.

The Howell Lithographing Company, Hamilton, will build an extensive addition to its plant for which new machinery equipment will be required.

The Canadian Steel Package Company, Ltd., Morrisburg, Ont., has been incorporated to manufacture galvanized iron and steel barrels, boxes, etc., and will build and equip a plant for the purpose. The incorporators, W. H. McGannon, F. H. Broder, W. W. Flynn; capital stock, \$500,000.

Western Canada

WINNIPEG, MAN., October 4, 1912.

There are not many new announcements this week of developments requiring extensive purchase of machinery. The different machinery merchants, however, report a satisfactory volume of business. Lumber mills, flour mills, woodworking factories, etc., are constantly adding new equipment, and considerable machinery is being absorbed by the British Columbia mining plants. There is still an active demand for waterworks supplies of nearly all kinds. A very large amount of waterworks machinery and equipment has been contracted for in western Canada and prospects are favorable for activity in that respect next year. The weather recently has been much more suitable than previously for threshing, and conditions generally in this part of Canada indicate continued prosperity.

A report from Medicine Hat, Alberta, says that the Ontario & Manitoba Milling Company, Ltd., Ottawa, has signed an agreement to erect a large flour mill there. It is also stated that the Maple Leaf Flour Mills Company, Ltd., which has mills at Brandon, Man., and Kenora, Ont., will erect a 3000 barrel mill at Medicine Hat. The construction of a large plant at that place for The Ogilvie Flour Mills Company, Ltd., is now under way.

A. R. Walton, general manager of the St. Louis Car Company, St. Louis, Mo., is the principal in the Canada Standard Automobile & Tractor Company, Ltd., which has executed an agreement to establish a manufacturing plant at Moose Jaw, Sask. It is said that Mr. Walton owns a plant at Fort Wayne, Ind., which will be moved to Moose Jaw.

The Morley Twine & Machinery Company, Sioux City, Iowa, contemplates establishing a factory at Moose Jaw, Sask., for making twine. The Canadian concern will be known as the Consumers' Cordage Company, Ltd., and will have a capital stock of \$500,000.

The Farmers' Machine Company has been organized at Watrous, Sask., to establish there a factory for making various kinds of farm implements.

The Mount McKay Brick Company, Ltd., has been organized at Fort William, to erect and operate a \$100,000 brick plant there.

The light and power department of the City of Winnipeg is contemplating enlarging the city's power plant at Point du Bois, Man., to take care of the steadily increasing business. The chairman of the department says that it is absolutely necessary to add to the equipment and capacity of the plant, and recommends that William Kennedy, Jr., of Montreal, be retained as consulting hydraulic engineer.

The Acme Sash & Door Company, Ltd., St. Boniface, Man., is erecting a factory in that city.

The Thunder Bay Elevator Company, Ltd., Port Arthur, will install a grain drier, at a cost of \$25,000. It will have a capacity of 1000 bushels per hour.

W. H. Dwyer & Co., grain dealers, Ottawa, have opened an office at Fort William, and will erect there in the near future an elevator with a capacity of 150,000 bushels.

A proposition made by a number of Winnipeg grain men, under the name of the Great West Grain Company, Ltd., to build a 200,000 bushel grain hopper and a 1,000,000 bushel elevator at Moose Jaw has been ratified by the City Council. The company receives a site and extensive trackage at a nominal sum, and it guarantees to extend the elevator capacity to 5,000,000 bushels by 1915.

John E. Dahl, of Hillsboro, Kan., will erect an elevator of 30,000 bushels capacity at Herbert, Sask.

The Alberni Hydroelectric Company, Ltd., Port Alberni, B. C., proposes to install a power plant at Beaver Creek, at the base of Beaufort Mountain, B. C. The authorities of Port Alberni are negotiating with the company for 8000 horse power.

The town of Rapid City, Man., is contemplating the installation of an electric light plant, at a cost of about \$20,000.

The Red Deer Development Company, Edmonton, Alberta, Canada, has been incorporated with an authorized capital stock of \$1,000,000 as proprietary company, under which the Red Deer Mfg. Company with a capital stock of \$200,000, will build a machine shop, plow and wagon factory on a tract of 640 acres recently acquired.

The Wetaskiwin Bedding Company is erecting a factory at Medicine Hat, Alberta. The material is expected to be obtained from the Alberta Rolling Mills there.

Government Purchases

WASHINGTON, D. C., October 7, 1912.

The United States Engineer Office, Nashville, Tenn., will open bids November 2 for furnishing and installing machinery to operate dipper dredge.

The Isthmian Canal Commission, Washington, will open bids October 25, under canal circular 737, for 18 guard valve machines complete, except motor; circular 739, for furnishing equipment for the new Colon water works, including air compressors, air hoists and miscellaneous details for the filter building, necessary multistage electrically driven power pumps, transformers, traveling crane, etc., and under circular 740, October 24, for a gasoline engine for launch and a hoisting engine for ladder dredge.

The Bureau of Yards and Docks, Navy Department, Washington, opened bids September 28 for furnishing four centrifugal pumps for delivery to Newport, R. I., as follows:

Jeanesville Iron Works, New York, \$6,500, alternate, \$6,875; Power Equipment Company, Boston, Mass., \$13,362; Alberger Pump & Condenser Company, New York, \$4,060 and \$2,499, alternate; D'Olier Centrifugal Pump & Machine Company, Philadelphia, Pa., \$7,284.

For furnishing fuel oil engines, generators and accessories, Westinghouse Electric & Mfg. Company, Washington, D. C., \$4,513; Busch-Sulzer Bros. Diesel Engine Company, St. Louis, Mo., \$37,750, \$31,733, \$6,017 and \$37,530.

The Treasury Department, office of the supervising architect, Washington, opened bids October 1 for furnishing and installing a mechanical system of mail handling apparatus in the United States post office, New York City, as follows:

Lamson Company, Boston, Mass., \$68,597; Webster Mfg. Company, New York, \$48,000, part bid; James H. MacLaughlin Engineering Company, Baltimore, Md., \$45,000, part bid.

The Greenfield Tap & Die Corporation, a holding company that controls the stock of the Wiley & Russell Mfg. Company and Wells Brothers Company, on October 1 acquired the entire stock of the A. J. Smart Mfg. Company, which was organized six years ago and promptly established a name for the manufacture of the highest class of taps, dies and screw plates. The company acquired will be conducted as a separate organization and conditions are extremely favorable for the continuation of its very rapid growth. The new officers are: President, F. O. Wells; vice-president, Rollin S. Bascom; treasurer and clerk, F. H. Payne; directors, the above, William M. Pratt and J. W. Stevens.

The net car shortage on the railroad lines of the United States and Canada was 17,793 on September 26, as compared with 8,620 on September 12. This is the largest shortage reported since November, 1907, immediately after the panic. The largest car shortage in the history of the company occurred in the autumn of 1906, but, as the fortnightly reports of the American Railway Association only began in 1907, the largest car shortage on record was the 137,847 cars reported on February 6 of that year.

George C. Finley and Adolph Rebadow have been appointed receivers of the E. R. Thomas Company, Buffalo, N. Y., by the United States District Court of western New York. The factory of the company is being operated by the receivers who will continue to keep it a going concern until a purchaser can be found.

Trade Publications

Steel Balls.—J. S. Bretz Company, 250 West Fifty-fourth street, New York City. Folder. Calls attention to a line of German chrome steel balls, for which this company is the sole importer. These are made in sizes ranging from 1/16 to 4 in. in diameter, and a table of the sizes, approximate weights and prices is included.

Oxy-Acetylene Welding Apparatus.—Economy Welding Machine Company, Southwest boulevard and Central street, Kansas City, Mo. Pamphlet. Treats of the Economy line of portable and stationary welding and cutting apparatus. A description of the various parts, such as the oxygen and acetylene generators, the purifying tanks and the torch is briefly given, the text being supplemented by illustrations. A number of repairs which have been made by this apparatus are also shown.

Rotary Steam Engine.—Motsinger Rotary Engine Company, Greensburg, Pa. Bulletin No. 2. Describes a new type of double rotary steam engine which was illustrated in *The Iron Age*, August 4, 1910. The construction and operation of this engine is gone into at some length, and the text is supplemented by several line drawings.

Motor Drive for Machine Tools.—Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa. Two descriptive leaflets. No. 2480 gives rules for the selection of machine tool motors and some valuable information relative to this subject as well as several application views. No. 3516 gives the rating and classes of motors which are suitable for various types of machine tools, the information being contained in a convenient form. A diagram giving the relation between the cutting speed in feet per minute and the area and volume of the cut in square and cubic inches is also included.

Ventilation.—Decatur Cornice & Roofing Company, Inc., New Decatur, Ala. Booklet entitled "All About Ventilation." Is an explanatory treatise about the value of perfect ventilation for public buildings, churches, schools, factories, etc. It describes in detail the Alabama corrugated rim ventilator which is made from open-hearth galvanized sheet iron and shows its application to various classes of buildings. Several views of installations are given, and a number of testimonial letters are included.

Gasoline Engines.—Kuhner Engine Company, Inc., Oxford, Md. Catalogue. Describes two-cycle single, two and three cylinder; four-cycle double-cylinder and four-cylinder marine and four-cycle stationary gasoline engines. The stationary engines are made in sizes ranging from 1 1/2 to 18 hp., and the marine type range in power from 4 1/2 to 75 hp.

Electric Drilling Machines.—Temco Electric Motor Company, Leipsic, Ohio. Two circulars. Call attention to the various types of portable electric drilling machines with handle, ratchet feed and standard chuck built by this company. All of these tools will operate on either direct or alternating current circuits and will run in either direction.

Concrete Piles.—MacArthur Concrete Pile & Foundation Company, 11 Pine street, New York City. Booklet entitled "The Pedestal Pile." This is a revised edition containing a number of illustrations and descriptions of work recently completed together with additional text. It also contains valuable data on the bearing power of soils, frictional resistance, etc., besides a complete description of the pile and how it is constructed.

Cranes, Tracks, Trolleys and Hoists.—New Jersey Foundry & Machine Company, 90 West street, New York City. Form No. 358. Illustrates the various types of single and double I-beam, hand power traveling and underhung cranes and transfer bridges, Coburn, gantry, jib, wall and circular cranes, runways, brackets and supporting structures which this company builds together with the Changeezy and various other types of I-beam and bar trolleys. In the case of the cranes practically all are views of installations, and among those shown is that in the foundry of the Torrence Malleable Iron Company, which was illustrated in *The Iron Age*, February 23, 1911. An illustrated description of the Changeezy trolley appeared in *The Iron Age*, May 26, 1910.

Hydraulic Accumulators.—Watson-Stillman Company, 190 Fulton street, New York City. Catalogue No. 84. Size, 6 x 9 in.; pages, 56. Illustrates, tabulates and fully explains the seven principal types of accumulators manufactured by this company. A few pages are also devoted to accumulator accessories and to special hydraulic testing apparatus, reservoirs, etc.

Iron Cement.—Smooth-On Mfg. Company, 572 Communipaw avenue, Jersey City, N. J. Instruction book and illustrated catalogue No. 12. Tells about the Smooth-On iron cements, paints, sheet packings and corrugated metal gaskets, and shows when, where and how to use them. After a brief description of the various products and directions for their use, a number of repairs made with these materials are illustrated and briefly described.

Cranes and Pneumatic Hoists.—Vulcan Engineering Sales Company, 2014 Fisher Building, Chicago, Ill. Three circulars. Nos. V 20 and 21 illustrate and describe the various types of jib and hand power traveling cranes and I-beam trolleys sold by this company. The third circular is devoted to pneumatic hoists which are built for all classes of service in capacities up to 15 tons. These hoists are made in the single-acting, the air balanced and the air balanced and load retaining types. Horizontal multiple hoists are also shown and a brief table of specifications is included.

Pipe and Nipple Threading Machinery.—Landis Machine Company, Waynesboro, Pa. Catalogue No. 20. Refers to an extensive line of machinery for pipe and nipple threading. In these machines a rotary automatic die is used for the pipe and nipple threading and a manually-operated stationary die for the pipe work. After a short description of the special features of the chasers, their holders and the die head, several of the machines are illustrated and briefly described. An illustrated description of the stationary die head appeared in *The Iron Age*, September 1, 1910.

Metalworking Machinery.—Hill, Clarke & Co., 125 North Canal street, Chicago, Ill. Cloth bound catalogue. Size, 8 x 10 1/2 in. Lists all of the various types of metalworking machinery carried in stock by this company. Practically all of the machines are given a single page in the book, a halftone engraving of the machine followed by specification and dimension tables and a brief statement of the equipment being given on the front of the leaf, while on the back as far as space will permit a description of the construction and operation of the machine appears supplemented by line drawings and photographs of the interior mechanism. In this way the book has been made valuable not only to the buyer and shop superintendent, but also to the shop man who wishes to become acquainted with the interior construction and operation of the machines. The machines covered include boring, broaching, drilling, grinding, gear hobbing, key seating, metal sawing, milling, pattern making, pipe threading and cutting-off, planing, shaping and screw machines; chucks, die heads, lathes of various types, power hammers and presses. In making up the catalogue an alphabetical arrangement of the machines by titles has been followed.

Sand Blast Machinery.—J. W. Paxson Company, Philadelphia, Pa. Bulletin No. 28. Points out the special advantages of using the Paxson Warren sand blast machinery, and shows the various pieces of apparatus. These include portable and stationary power machines, hand cleaning machines, sand screens, elevators, tumbling barrels and exhaust fans. All of these are illustrated and briefly described together with accessories, such as helmets, nozzles, gloves, etc.

Lifting Clamps.—William E. Vols, 126 Liberty street, New York City. Circular. Gives general description and specifications for a patent lifting clamp which is made in capacities ranging from 1/2 to 50 tons for handling plates, beams and structural shapes; for use in steel works, rolling mills, boiler and tank shops, iron and brass foundries and annealing furnaces; for loading and unloading steam ships and railroad cars and wherever a clamp can be substituted for slings and ropes. Two types of clamp are made with the working parts exposed and protected by a steel housing.

Pattern Makers' Disk Grinding Machine.—Charles H. Besly & Co., 118 North Clinton street, Chicago, Ill. Folder. Relates to the No. 15 pattern makers' disk grinding machine which was illustrated in *The Iron Age*, August 1, 1912. This machine is designed for grinding flat surfaces on wood and for grinding, beveling, mitering and finishing woodwork. It can also be used on metal pattern work and for doing cylindrical grinding. The machine is illustrated and described at some length, and there are brief descriptions and halftone engravings of the different attachments which can be furnished as well as examples of work turned out by the machine.

Manilla Rope.—C. W. Hunt Company, West New Brighton, N. Y. Catalogue No. 12-8. Is a brief treatise for engineers on ropes used in the transmission of power together with formulas, tables and data useful in mill engineering. After a discussion of the way in which this rope is made and a list of the technical terms relating to cordage, the subject of transmission rope is taken up with a discussion of its advantages, the different systems employed and the various features. A complete appendix gives reports of several tests made on ropes for the transmission of power, and there are a number of views of installations together with illustrated instructions for splicing the rope.

Concrete Floor Construction.—Trussed Concrete Steel Company, Detroit, Mich. Form No. 430. Deals with a new type of reinforcement for concrete floors which is known as the Floredome. These are rectangular dome-shaped steel tiles with the bottom side open and are supported by the reinforcing material employed in the floor construction. As compared with terra cotta tile the device is much lighter and the joints are tight, thus avoiding the loss of concrete. *The Iron Age*, August 1, 1912, contained an illustrated description of this type of floor construction.

Herringbone Gears.—Earle Gear & Machine Company, Wyoming and Stenton avenues, Philadelphia, Pa. Pamphlet. Concerned with the use of herringbone gears as a substitute for spur gearing. The various features of these gears, such as smooth uniform motion, high speed, wearing quality, noiseless operation, greater strength per unit of weight and the elimination of end play are briefly discussed. There are a number of illustrations scattered throughout the pamphlet showing the different sizes of gears made.

Molding Machines.—International Molding Machine Company, 2300 South Western avenue, Chicago, Ill. Three folders. Describe and illustrate three types of molding machine, the type H power squeezer, the type J special jar ramming machine for core work and the type M combination jar ramming and turn-over draw molding machine.

